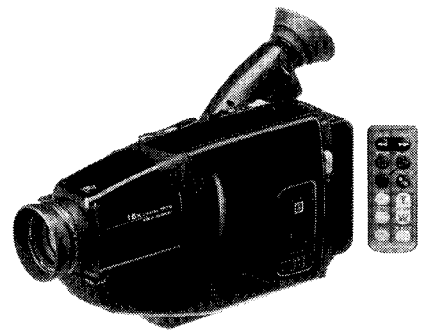


Service Service Service



Service Manual

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Survey of accessories :

Camcorder set M820/21 consists of

- | | |
|-------------|---------------------------------|
| - M820/01 | Camcorder |
| - SBC5450 | AC adapter |
| - 22AV5217 | DC adaptor cable |
| - SBC5262 | Rechargeable Battery 6V/1.2 Ahr |
| - SBC5513M | AV Eurocable (mono) |
| - 22AV5514M | Scartadapter |
| - 22AV5180 | Carrying strap |
| - SBC5457 | Remote hand unit |
| - 22AV5225 | Remote holder |

Camcorder set M870/21 consists of

- | | |
|------------|---------------------------------|
| - M870/01 | Camcorder |
| - SBC5450 | AC adapter |
| - 22AV5217 | DC adaptor cable |
| - SBC5262 | Rechargeable Battery 6V/1.2 Ahr |
| - SBC5513 | AV Eurocable (HI-8) |
| - 22AV5514 | Scartadapter (HI-8) |
| - 22AV5180 | Carrying strap |
| - SBC5457 | Remote hand unit |
| - 22AV5225 | Remote holder |

Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified be used.

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TECHNICAL DATA M820/ M870	
General	
Voltage	6V DC
Power	5.3W (Record, battery mode)
Video recording system	PAL
Audio FM recording system	M820 Mono, M870 Stereo
Tape format	8mm
Camera part	
Pick up element	CCD
Autofocus system	Video AF system
Minimum illumination	2 lux
Image sensor	1/3" CCD
Lens	Built in 8:1 zoom lens with electrical zoom, F1.4,(4-48mm), lens diam. 34mm
Electrical zoom	x24 (x16 and 1.5 instant zoom)
View finder	B/W view finder
Video	
Heads	2 rotary heads
Output	1.0Vp-p/ 75Ω unbalanced
Audio	
Output	-8dB, less than 1kΩ
Weight	approx. 710g (without Battery pack)
Dimensions	91 (W)x116 (H)x205 (D)

Weight and dimensions shown are approximate.
Specifications are subject to change without notice.

Safety instructions

- Safety regulations demand that the set be restored to its original condition and that components identical with the original types be used.
Safety components are marked by the symbol 
- All IC s and many other semi- conductors are susceptible to electrostatic discharges(ESD). Careless handling during repair may reduce life drastically. When repairing, make sure that you are conneted with the same potential as the mass of the set via a wrist wrap with resistance. Keep components and tools on the same potential.
- A set to be repaired should always be connected to the mains via a suitable isolating transformer.
- Never replace any modules or any other parts while the set is switched on.
- Use plastic instead of metal alignment tools. This in order to prelude short-circuit or to prevent a specific circuit from being rendered unstable.

REMARKS

- The direct voltages and oscillograms ought to be measured relative to the set mass.
- The oscillograms and direct voltages have been measured in RECORD or PLAY mode.
- The semiconductors, which are mentioned in the circuit diagram and in the parts lists, are fully exchangeable per position with the semiconductors in the set, irrespective of the type designation of these semiconductors.

Sicherheitshinweise

- Die Sicherheitsvorschriften erfordern es, daß sich das Gerät nach der Reparatur in seinem originalen Zustand befindet und daß die zur Reparatur benutzten Ersatzteile mit den OriginalErsatzteilen identisch sind.
Sicherheits-Bauteile sind mit der Markierung versehen. 
- Alle IC's und Halbleiter sind empfindlich gegen elektrostatische Entladungen (ESD). Unvorschriftmässige Behandlung von Halbleitern im Reparaturfall, kann zur Zerstörung dieser Bauteile oder zu einer drastischen Reduzierung der Lebensdauer führen. Sorgen Sie dafür, dass Sie sich im Reparaturfall über ein Armband mit Widerstand auf dem gleichen Potential, wie die Masse des Gerätes befinden. Alle Bauteile, Werkzeuge und Hilfsmittel sind auf das gleiche Potential zu legen.
- Ein zu reparierendes Gerät ist immer über einen Trenn-transformator an die Netzspannung anzuschliessen.
- Bei eingeschaltetem Gerät dürfen keine Module oder sonstige Einzelteile ausgetauscht werden.
- Zum Abgleich sind ausschliesslich Kunststoffwerkzeuge zu benutzen (keine Metallwerkzeuge verwenden). Dadurch wird vermieden, dass ein Kurzschluß entstehen kann oder eine Schaltung instabil wird.

ANMERKUNGEN

- Die Gleichspannungen und Oszillogramme sind gegen Gerätemasse zu messen.
- Die Oszillogramme und Gleichspannungen sind in RECORD oder PLAY gemessen.
- Die in den Stücklisten aufgeführten Bauteile sind positionsweise voll auswechselbar gegen die Bauteile in dem Gerät, ungeachtet der etwaigen Typenbezeichnungen.

AVERTISSEMENTS

- Les normes de sécurité exigent qu'après réparation l'appareil soit remis dans son état d'origine et que soient utilisées les pièces de rechange identiques à celles spécifiées.
Les composants de sécurité sont marqués 
- Tout les IC et beaucoup d'autres semi-conducteurs sont sensibles aux décharger statiques (ESD). Leur longévité pourrait être considérablement écourté par le fait qu'aucune précaution n'est prise à leur manipulation. Lors de réparations s'assurer de bien être relié au même potential que la masse de l'appareil et enfiler le bracelet serti d'une résistance de sécurité. Veiller à ce que les composants ainsi que les outils que l'on utilise soient également à ce potentiel.
- Toujours alimenter un appareil à réparer à travers un transfo d'isolement.
- Ne jamais remplacer les modules ni d'autres composants quand l'appareil est sous tension.
- Pour l'ajustage, utiliser des outils en plastique au lieu d'instruments métalliques. Ceci afin d'éviter les court - circuits et exclure l'instabilité dans certains circuits.

OBSERVATIONS

- La mesure des tensions continues et des oscillogrammes doit se faire par rapport à la terre de l'appareil.
- Les oscillogrammes et tension sont mesurées en mode RECORD ou PLAY.
- Les semi-conducteurs indiqués dans le schéma de principe et à la liste des compostants, sont interchangeableables par repère sur ce chassis avec les semi-conducteurs de l'appareil quelle que soit la désignation de type donnée sur ces semi-conducteurs.

AVISOS

- Las instrucciones de seguridad exigen que, después de la reparación, el aparato se encuentre en el estado original y que las piezas de repuesto, utilizadas para la reparación, sean idénticas a las originales.
Los componentes de seguridad están marcados con 
- Todos los IC y semiconductores son sensibles a descargas electrostáticas (ESD). Un tratamiento no conforme a las instrucciones de semiconductores, en caso de reparación, podría llevar a la destrucción de estos componentes o a una reducción drástica de la duración. En caso de reparación tenga cuidado de que esté al mismo potencial que la masa del aparato, por una pulsera con resistencia. Ponga todos los componentes, herramientas y recursos al mismo potencial.
- Para reparar un aparato hay que conectarlo siempre a la alimentación a través de un transformador de aislamiento.
- Cuando un aparato está en marcha no pueden ser cambiados módulos u otras piezas de repuesto.
- Para los ajustes hay que utilizar exclusivamente herramientas de plástico (nunca herramientas metálicas). Así se evitarán cortocircuitos y circuitos inestables.

NOTAS

- Hay que medir las tensiones continuas y los oscilogramas contra la masa del aparato.
- Los oscilogramas y las tensiones continuas son medidas en "RECORD" y "PLAYBACK"
- Los componentes mencionados en las listas se los puede cambiar por los componentes en el aparato, a pesar de eventuales designaciones de tipos.

VEILIGHEIDSIINSTRUCTIES

- Veiligheidsbepalingen vereisen, dat het apparaat in zijn oorspronkelijke toestand wordt teruggebracht en dat onderdelen, indientiek aan de oorspronkelijke, worden toegepast. De veiligheidsonderdelen zijn aangeduid met het symbool 
- Alle IC's en vele andere halfgeleiders zijn gevoelig voor elektrostatische ontladingen (ESD). Onzorgvuldig behandelen tijdens reparatie kan de levensduur drastisch doen verminderen. Zorg ervoor, dat U tijdens reparatie via een polsband met weerstand verbonden bent met hetzelfde potentiaal als de massa van het apparaat. Houd componenten en hulpmiddelen ook op ditzelfde potentiaal.
- Sluit een apparaat dat gerepareerd wordt altijd via een scheidingstransformator aan op de netspanning.
- Verwissel nooit modules of andere onderdelen terwijl het apparaat is ingeschakeld.
- Gebruik voor het afregelen plastic i.p.v metalen gereedschap. Dit om mogelijke kortsluiting te voorkomen of een bepaalde schakeling instabiel te maken.

OPMERKINGEN

- De gelijksspanningen en oscillogrammen dienen gemeten te worden ten opzichte van de apparaat aarde.
- De oscillogrammen en gelijksspanningen zijn in RECORD of PLAY mode gemeten.
- De halfgeleiders, die in het pricipeschema en in de stuklijsten, zijn vermeld, zijn per positie volledig uitwisselbaar met de halfgeleiders in het apparaat, ongeacht de typeaanduiding op deze halfgeleiders.

AVVERTIMENTI

- Le prescrizioni di sicurezza richiedono che l'apparecchio sia ricondotto alle condizioni originali e che siano usati ricambi originali. Componenti di sicurezza sono marcati con 
- Tutti gli IC e semiconduttori sono sensibili a scariche elettrostatiche (ESD). Noncuranze durante la riparazione di semiconduttori possono danneggiarli o condurre ad una riduzione drastica della durata. Durante la riparazione assicurarsi di essere collegati allo stesso potenziale attraverso un bracciale di protezione contro scariche elettrostatiche. Inoltre tenere anche tutti i componenti e gli attrezzi a questo potenziale.
- Apparecchi da riparare bisogna collegarli sempre via un trasformatore isolante (separatore) alla tensione normale.
- Non scambiare moduli o altri componenti quando l'apparecchio è in funzione.
- Per l'accordo usare soltanto attrezzi di plastica (non usare attrezzi metallici). Così si evitano cortocircuiti e collegamenti instabili.

OSSERVAZIONI

- Misurare le tensioni continue e gli oscillogrammi riferendosi alla massa dell'apparecchio.
- Gli oscillogrammi e le tensioni continue sono misurati in RECORD o PLAYBACK.
- I semiconduttori che sono menzionati negli schemi e nelle liste sono intercambiabili con quelli di pari tipo nonstante siano montati in posizione diverse.

SERVICE MANUAL ABBREVIATION LIST

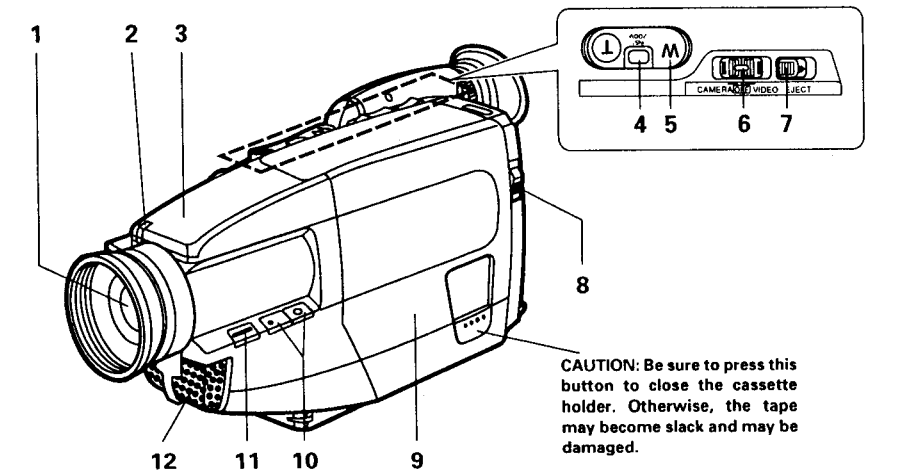
A	
ACC	Automatic Color Control
ACK	Automatic Color Killer
ADC B-Y	Analog to Digital Converted B-Y Signal
ADC R-Y	Analog to Digital Converted R-Y Signal
ADC Y	Analog to Digital Converted Luminance
ADD	Adder
ADRS	Address
A.DUB	Audio Dubbing
AF	Autofocus
AFC	Automatic Frequency Control
AGC	Automatic Gain Control
AGC KILLER	AGC Killer Voltage
ALC	Automatic Level Control
AIC	Automatic Iris Control
AM	Amplitude Modulation
AMP	Amplifier
APC	Automatic Phase Control
ASBL	Assemble (Phase Matching)
AUD.	Audio
AUX	Auxiliary
A5V	Always 5V B+ Source
B	
B (BLU)	Color Signal BLUE
BATT.	Battery
BF	Burst Flag
BG	Burst Gate or Back Ground
BGP	Burst Gate Pulse
BH	Power Supply for Selecting VHF High Band
BL	Power Supply for Selecting VHF Low Band
BLK	Blanking
BM	Power Supply for Selecting VHF Mid Band
BPF	Bandpass Filter
BS	Power Supply for Selecting VHF Super Band
BU	Power Supply for Selecting UHF Band
BU	Back-up
BUF.	Buffer Amplifier
B-YL	Battery
C	
C	Chroma
C (CHROMA)	Chrominance Signal
CAPST.	Capstan
CAS	Column Address Strobe
CARRI.	Carrier
CATV	Cable TV
C.BLANK	Chroma Blanking
C.BLK	Composite Blanking
CCD	Charge Coupled Device
CG	Character Generator
C.FG/CFG	Capstan Frequency Generator
C.FREE RUN	Chapstan Free Run
CH	Channel
CHD	Camera Horizontal Drive Pulse
CHAR.	Character
CHROMA	Chrominance
C.MEMORY	Counter Memory
CNR	Chroma Noise Reducer
COM.	Common
COM.	Composite
COMPA	Comparator
COMPE	Compensator
COMPO	Composite
COMP-EXP	Compressor-Expander
CONV.	Converter
CONT	Control
CORR.	Correlation
COUNT.	Counter
CP	Clamp Pulse
C.PAUSE	Camera Pause
C/R	Capacitor/Resistor
C.RESET	Counter Reset
C.REVERSE	Count Reverse
CST	Cassette

C	
C.SYNC	Composite Synchronizing Signal
CTL	Control Track Pulse (Control)
CYL	Cylinder
CY (CYAN)	Color Signal CYAN
D	
DA	Double Azimuth
D/A	Digital to Analog Converter
D-D	Direct Drive
DEEMPHA.	Deemphasis
DEF	Deflection
DEM.O.	Demodulator
DEMPX	Demultiplexer
DET	Detector
DIFF. AMP	Differential Amplifier
DISCRI.	Discriminator
DISP.	Display
DL	Delay Line
DN	Down
DO	Dropout
DOC	Dropout Compensator
DRAM	Dynamic Random Access Memory
D.REF 25/30	Delayed Reference 25/30Hz
D.SW 25/30	Delayed Switching 25/30Hz
DSP	Digital Signal Processor
DT/OE	Data Transfer/Output Enable
D/W	Dark/White
DWC	Delayed Write Clock
E	
EA-ROM	Electrically Alterable Read Only Memory
E-E	Electronic-to-Electronic
EMPHA.	Emphasis
EQ	Equalizer
EVF	Electronic Viewfinder
EXT.	External
F	
F.ADV	Frame Advance
F/V	Frequency-to-Voltage Converter
FB	Feed Back
FF	Flip Flop
F.FWD	Fast Forward
FG	Frequency Generator
FM	Frequency Modulation
FREQ.	Frequency
FRAME ADV	Frame Advance
Fsc	Color Sub Carrier Frequency
FWD	Forward
G	
GEN	Generator
GND	Ground
H	
H	Horizontal
HBF	Horizontal Burst Flag
HD	Horizontal Drive
Hi-Fi	High Fidelity
HLT	Halt
HPF	High-pass Filter
HPL	High-pass Limiter
HSS	Horizontal Sync. Separator
I	
IF	Intermediate Frequency
INC	Row Counter Increment
INDI.	Indicator
INT.	Internal
INV.	Inverter
I/O	In/Out (Input/Output)
IR	Infrared Rays
IRIS DET	Iris Detection
IRT	Instant Recording Timer
L	
LCD	Liquid Crystal Display
LIN.	Linear
LM	Loading Motor

L	
LNC	Line Noise Canceller
LOG	Logarithm
LP	Long Play
LP (H)	Long Play Signal (Active High)
LPF	Low-pass Filter
LUMA	Luminance
L/R	Left/Right
M	
MAN	Manual
M.BRAKE	Main Brake
M.CUT	Monitor Cut
MEM.	Memory
MEM ON	Memory ON
MEM SW	Memory Switch
MEM VIDEO	Memorized Video
MIX	Mixer
MMV	Monostable Multivibrator
MOD.	Modulator
MPX	Multiplex
MPX VIDEO	Multiplexed Video
M.STATE	Mechanism State
M.STOP	Memory Stop
MTS	Multi Channel Television Sound
N	
NEG	Negative
NFB	Negative Feed Back
NORM. or NOR.	Normal
NR	Noise Reduction
O	
OB	Optical Black
O/E	Odd/Even Field
OSC	Oscillator
OSD	On-Screen Display
P	
PB/PLAY	Playback
P.CONT	Power Control
PIF	Picture Intermediate Frequency
PG	Pulse Generator
P IN P	Picture in Picture
PIX MOVE	Picture Move
PLL	Phase Locked Loop
POS.	Positive
POWER CONT.	Power Control
PROG.	Program
PROTECT.	Protector
PWM	Pulse Width Modulation
R	
R (RED)	Color Signal RED
RAM	Random Access Memory
RAS	Row Address Strobe
RC	Reading Clock
RCC	Reading Clock Clear
RCR	Row Counter Reset
REC	Record
RECT.	Rectifier
REF	Reference
REF 25/30	Reference 25/30Hz from servo circuit
REG	Regulator
REL	Refresh Control
REW	Rewind
REV	Reverse
RF	Radio Frequency
RM	Reel Motor
ROM	Read Only Memory
R-YL	Color Difference Signal R-YL
S	
SAP	Second Audio Program
SAW	Sawtooth
SC	Serial Control
SC1 (0°)	3.58MHz Subcarrier Signal 1 (0-degree Phase Shifted)

S	
SC2 (90°)	3.58MHz Subcarrier Signal 2 (90-degree Phase Shifted)
SEP.	Separator
SG	Signal Generator
S/H	Sample and Hold
SIF	Sound Intermediate Frequency
SOL	Solenoid
SP	Standard Play
SP/LP	Standard Play/Long Play
S.REEL	Supply Reel Sensor
SRCH	Search
SRV	Servo
STABI.	Stabilizer
S.TRACK	Slow Tracking
STBY	Standby Mode
S-VHS	Super VHS
SW 15Hz	15Hz Head Switching Pulse
SW 25/30Hz	25/30Hz Head Switching Pulse
SYNC	Synchronizing signal
SYS.CON	System Control
T	
T (TELE)	Telephoto Angle
T.BRAKE	Take-up Brake
T/L	Tuner/Line
TP	Test Point
T.REEL	Take-up Reel Sensor
T.RESET	Timer Reset
TRS	Transfer
TμP	Timer Microprocessor
TU-μP	Tuning Microprocessor
U	
U/D	Up/Down
UNI.	Unified
V	
V (VERT)	Vertical
VAR	Variable
V.AGC	AGC Voltage
VCA	Voltage Controlled Amplifier
VCO	Voltage Controlled Oscillator
V.DRV	Vertical Drive Pulse
V.DUB	Video Dubbing
V/F	Voltage to Frequency Converter
VHS	Video Home System
VF	Focus Voltage
VOL.	Volume
V-REF	Voltage Reference
VP	Vertical Pulse
VSS	Vertical Sync. Separator
Vss	Voltage Super Source
VT	Tuning Voltage
VT-U	Tuning Voltage-UHF
VT-V	Tuning Voltage-VHF
VCKO	Voltage Controlled Crystal Oscillator
W	
WC	Write Clock
WCC	Write Clock Clear
WE	Weighting
WHT	Color Signal WHITE
WIDE	Wide Angle
WHD	Wide Horizontal Drive
WHT BAL CONT.	White Balance Control
Y	
Y	Luminance Signal
Y/C	Luminance/Chrominance
YE (YEL)	Color Singal YELLOW
YL	Luminance Signal (Low Component)
ANOTHER	
μP	Microprocessor
5V	ON 5V B+ Source
9V	ON 9V B+ Source

CONTROLS AND FUNCTIONS



- 1. Lens**
F1.4 (6 ~ 48mm) 8X power zoom lens features with auto focus and auto iris functions.

2. Record Indicator
This indicator lights up to indicate that the camera/recorder is recording.

3. Infrared Ray Receiving Section
Receives infrared rays from the remote controller unit.

4. INST. ZOOM (Instant Zoom) Button
Use this button to magnify the image being recorded 1.5 times momentarily.

5. Power Zoom Switch
This switch performs zooming electrically.
"W": Picture becomes wider gradually.
"T": Picture becomes telescopic gradually.

6. OPERATE Switch
This turns the camera/recorder on and off and also switches between the camera and VTR modes. Set the switch to "CAMERA" to turn the camera's power on and to "VIDEO" to turn the VTR's power. Press and hold the small red button in the switch to switch it.

7. EJECT Switch
Operates with OPERATE either on or off, if a power source is connected to the camera/recorder.

8. BATT EJECT (Battery Eject) Lever
Releases the battery (provided), external power adapter (provided) or battery housing (optional) attached to the camera/recorder.
- 9. Cassette Holder**
Slide EJECT switch to open the cassette holder. Be aware of the cassette direction when inserting.
NOTE: Power source must be connected to open the cassette holder.

10. FOCUS Control (AUTO/MAN) Buttons
Press these buttons simultaneously to switch between automatic and manual focusing. When "[Focus]" is not displayed in the viewfinder, focusing is automatic. If these buttons are pressed at the same time and "[Focus]" appears, the camera/recorder enters the manual focus mode. For manual focusing, press the ◀ or ▶ button to bring the subject into focus.

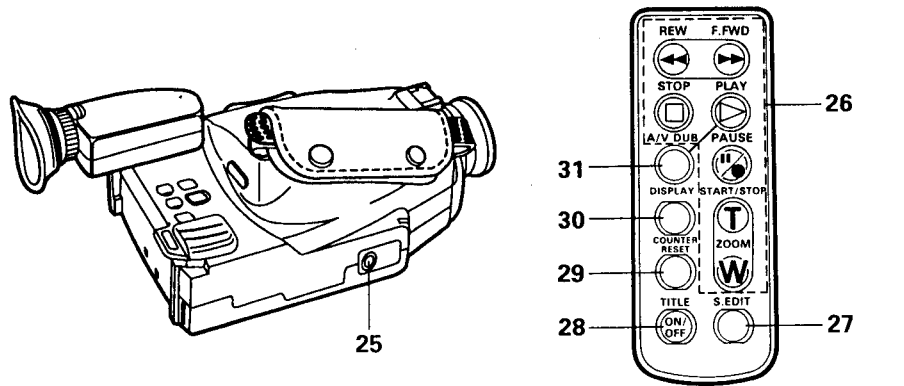
11. FADE Button
During recording you can add a professional touch to your recordings by fading in and out of the scenes. You can select the three fade modes — the white fade, wipe fade and zoom fade.

12. Stereo Microphone
Sensitive to sounds coming from the direction in which the camera is pointed.

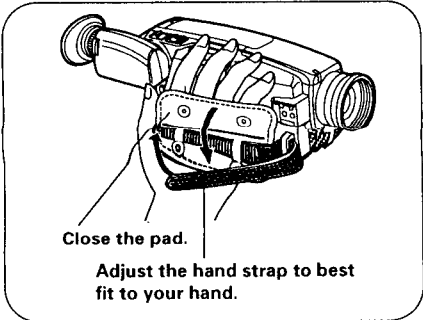
13. PLAY Button
Used for playback of tape.
NOTE: When the camera/recorder is in record/pause (stand-by) mode, pressing and holding this button will play the tape at normal.

14. Power Supply Attachment Section
Attach the battery (provided), external power adapter (provided) or battery housing (optional) here.

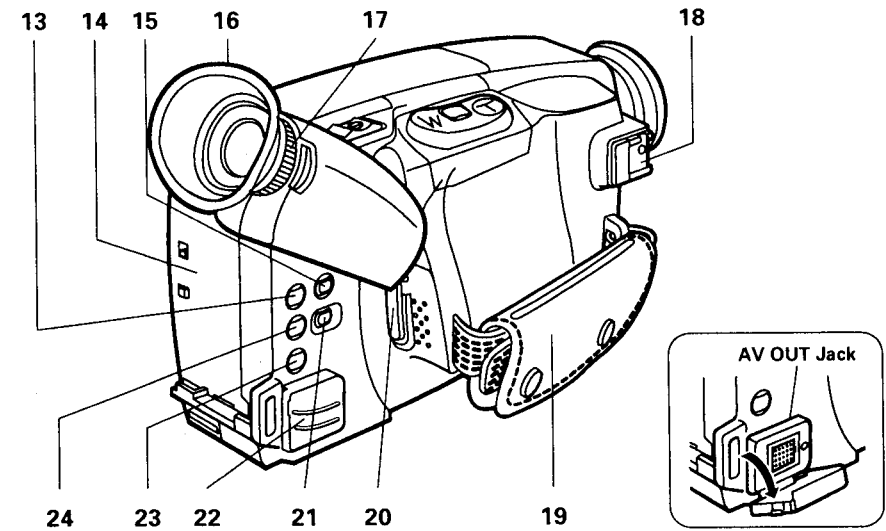
CONTROLS AND FUNCTIONS



- 25. Tripod Mount Screw**
Use this screw to mount the camera/recorder on a tripod (generally available).
- 26. Camera/Recorder Control Buttons**
These shaded buttons on the remote control function the same as those on the camera/recorder.
- 27. S. EDIT (Synchro Edit) Button (only on the remote controller)**
Use this button to activate the synchro edit function for dubbing.
- 28. TITLE ON/OFF Button (only on the remote controller)**
Use this button to store a title in memory or recall the stored title and record it superimposed on the picture being shot.
- 29. COUNTER RESET Button (only on the remote controller)**
Press this button to reset the linear time counter in the viewfinder to "0:00:0"
- 30. DISPLAY Button (only on the remote controller)**
Use this button to select the display in the viewfinder.
- 31. AV DUB Button (only on the remote controller)**
This button is used to record new audio and video in place of existing audio and video.



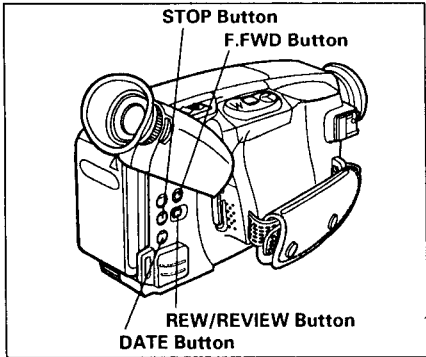
2. OPERATION



- 15. F.FWD Button**
Press this button during stop or rewind mode, and fast-forwarding starts. Press the button during playback of tape, and the tape is played back in the forward direction approximately 7 times faster than the normal speed to confirm the recorded content. Press PLAY button to return to normal playback mode or press STOP button to stop tape movement. Also use F.FWD button when setting the date/time.
NOTE: You can also visually scan forward when the camera/recorder is in record/pause (stand-by) mode by pressing and holding this button.
- 16. Eye Cup**
Pull out the eye cup all the way when using it and adjust the diopter control so that the subject is seen most clearly in the viewfinder. Always push in the eye cup after use.
- 17. Diopter Control**
To use the electronic viewfinder, turn this control for your optimum focus adjustment.
- 18. Camera Light Shoe**
Used to attach the camera light.
- 19. Hand Strap**
Adjust to best fit to your hand. (Refer to page 6)
- 20. Start/Stop Button**
This button is used to control the camera/recorder. When this button is pressed with the camera/recorder set to the record/pause mode, the tape runs to start recording. When this button is pressed again, the tape stops and the camera/recorder enters the record/pause (stand-by) mode. This button may be also used to display a still picture during playback mode.
- 21. REW/REVIEW Button**
Press this button during stop or fast forward mode, and fast-rewinding starts. Press the button during playback of tape, and the tape is played back in the rewind direction approximately 5 times faster than the normal speed to confirm the recorded contents. Press PLAY button to return to normal playback mode or press STOP button to stop tape movement. Also use this button to review the last few seconds of the tape you are recording. Use REW/REVIEW button when setting the date/time.
NOTE: You can also visually scan backward when the camera/recorder is in record/pause (stand-by) mode by pressing and holding this button.
- 22. AV OUT Jack (Behind the door)**
Use the AV stereo output cord (provided) or RF output adapter (optional) to connect this jack to a TV to view the pictures played back by the camera/recorder.
- 23. DATE Button**
Press this button to display the date and time in the viewfinder. Whenever the date and time appear in the viewfinder, they will be recorded on the tape.
- 24. STOP Button**
The STOP button is used to stop playback, rewind, and fast forward operations. The STOP button has no effect during record operation. Also use STOP button when setting the date/time.

DATE/TIME SETTING

The date and time can be recorded on your tapes to act as a handy reference when viewing them at a later time. Use the following procedure to set up this display for the current date and time. The time backup battery is rechargeable. Charge the backup battery every two months. Set the OPERATE switch to OFF and connect a charged battery or AC adapter/charger to the camera/recorder for 24 hours. Make sure that the current time is displayed correctly before you start recording.
NOTE: The backup battery should be charged every two months. If it is not charged periodically, it will be over-discharged and its life will be shortened.



- Slide the OPERATE switch to "CAMERA" while holding the small red button in the OPERATE switch down.
- Press DATE button.
"0:00" and "1/1/93" appears in the viewfinder and "1" flashes.
- Press F.FWD button to select correct date. Hold button down to advance rapidly. If you go past the date you want to set, press REW/REVIEW button. When the correct date appears, press STOP button.
- Press F.FWD button to select correct month. Hold button down to advance rapidly. If you go past the month you want to set, press REW/REVIEW button. When the correct month appears, press STOP button.

- Press F.FWD or REW/REVIEW button to select year, and then press STOP button.
- Press F.FWD or REW/REVIEW button to select correct hour, and then press STOP button.
- Press F.FWD or REW/REVIEW button to select correct minute.

- After setting to the correct minute, press DATE button to change the display and start the internal clock. It is recommended that you press DATE button to match the time signal.

■ To correct date/time after starting the date/time

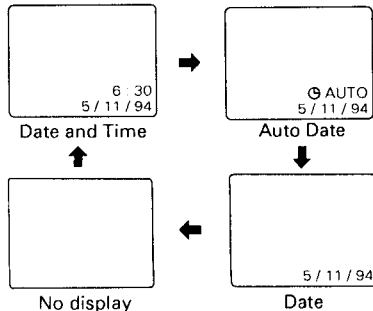
- Press and hold DATE button, and then press STOP button. The date starts flashing.
- Correct the incorrect digit by using F.FWD, REW/REVIEW and STOP buttons.

■ To correct date/time during programming

- Press STOP button repeatedly until the digit that is incorrect flashes.
- Correct the incorrect digit by using F.FWD, REW/REVIEW and STOP buttons.

■ To record date/time graphics

Press DATE button repeatedly to select the required date/time graphics in the viewfinder, then start recording.
• The display changes in the following order each time DATE button is pressed.



NOTE: Refer to "AUTOMATIC DATE RECORDING" on page 21 for recording the date only once.

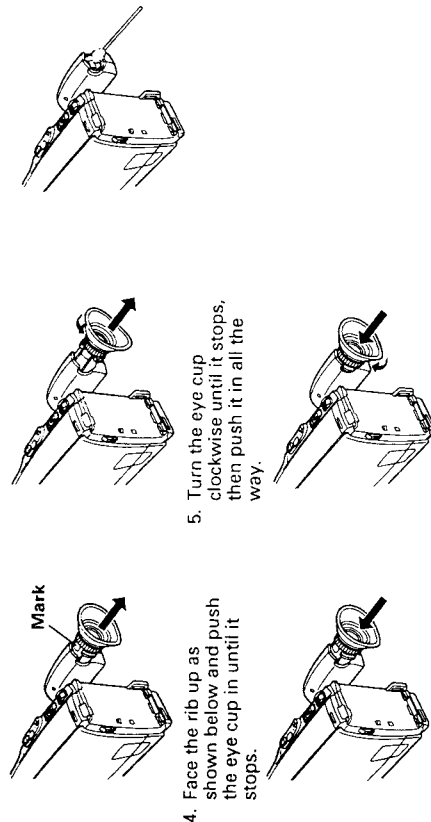
TROUBLESHOOTING

Symptom	Check Point & Correction
Cassette holder cannot be opened when you slide EJECT switch.	Connect the power source.
Cassette cannot be inserted into cassette compartment.	Load cassette in direction indicated by arrow on cassette. The cassette window must be towards the outside.
Picture does not appear in the viewfinder.	Remove the lens cap. Slide OPERATE switch to "CAMERA". Check the record-protect tab on the cassette. See page 14 for details. Set OPERATE switch to "CAMERA" position. Push the cassette holder embossed PUSH to close it.
The camera/recorder cannot go into the recording mode, even when Start/Stop button is pressed.	The " " indication in the viewfinder flashes to indicate battery is discharged. Try another battery or charge the battery. Set OPERATE switch to "VIDEO" position.
PLAY button cannot be engaged.	When you see the playback picture on your TV, adjust fine tuning knob on television set to obtain the best picture.
Interference on playback picture. (The TV is connected to the camera/recorder using the RF output adapter.)	Press FOCUS control (AUTO/MAN) buttons simultaneously to erase "Focus" in the viewfinder.
Picture is out of focus.	Auto-Focus does not operate correctly if a special-effects filter is attached or with the objects shown on page 17.
Auto-focus does not operate correctly.	If the record pause mode continues for more than 5 minutes, power is shut off automatically. Press the Start/stop button to restore the power.
Power is interrupted.	Remove the power source, and after about one minute, push the reset switch gently using a toothpick, etc. until you feel a click. The display will be reset. Then set the information again.
Power is not turned on and no button operations are accepted.	Have you moved the camera/recorder or cassette from a cold place to a warm place so that its temperature changed abruptly? If the temperature has changed, remove the cassette and set the OPERATE switch to OFF, then wait for about one hour.
"TROUBLE" appears in the viewfinder.	Remove the cassette and then try to reinsert: remove it several times. If the indication is still shown in the viewfinder, use a cleaning tape to clean the heads and replace the cassette.
"DEW" indication flashes in the viewfinder.	Condensation on the camera/recorder mechanism — wait until the unit has reached normal room temperature, and condensation has evaporated. "DEW" indication will stop flashing.

CLEANING THE INSIDE OF THE ELECTRONIC VIEWFINDER

If dust or foreign matter adheres inside the viewfinder, clean it by using the following procedure.

1. Pull out the eye cup to the position where a mark can be seen (up to a half where it is pulled out all the way). The side with the mark should be up.
2. Turn the eye cup counterclockwise until it stops, then pull it out to remove.
3. Clean the picture tube cover and lens. To prevent scratching, use a soft non abrasive cloth, swab or lens cleaning paper.



JIGS AND TAPES FOR ADJUSTMENT

1. ALIGNMENT TAPE COLOUR BAR/400Hz (20HSC-3)	2. CASSETTE TORQUE METER SRK-8T-232 SRK-8T-212	3. MASTER PLANE	4. REEL DISK HEIGHT JIG
5. SPECIAL DRIVER	6. ATF-R JIG (SW3:ON)	7. C12 LIGHT BALANCE FILTER 46mm φ	8. 2-PIN EXTENSION CABLE
※9. 2-PIN EXTENSION CABLE	※10. 10-PIN EXTENSION CABLE	※11. 9-PIN EXTENSION CABLE	※12. 17-PIN EXTENSION CABLE
13. DSP AV OUTPUT JIG	14. DSP-R JIG	※15. ADJUSTMENT FLOPPY DISK	★16. PERSONAL COMPUTER
★17. PERSONAL COMPUTER 9-PIN or 25-PIN CABLE	◎18. AV OUTPUT CABLE	19. AV INPUT CABLE	

MARKS

- ※ : New jigs and tools
- ★ : Goods on the Market
- ◆ : Optional Accessory
- ◎ : Accessory

- Note 1: Always set SW3 on the ATF-R jig to ON.
- Note 2: The ATF jig can also be used in place of ATF-R jig to adjust this model.
- Note 3: The DSP jig can also be used in place of DSP-R jig to adjust this model.
- Note 4: The illustration shows a stereo AV output cable, but a monaural output cable is provided with this unit. The adjustments can also be performed with a monaural output cable.

HOW TO USE THE EXTENSION CABLE

No.	NAME OF EXTENSION CABLE		HOW TO USE (PURPOSE OF USE)
8	2-PIN EXTENSION CABLE		• For power supply. (Red: Negative, Brown: Positive) • Power supply cable after the case removed.
9	2-PIN EXTENSION CABLE		• Installed between the main circuit board and loading motor.
10	10-PIN EXTENSION CABLE		• Installed between the main circuit board and cylinder. Note: Using this extension cable causes noise to occur in the playback picture. This cable is used to check voltage and waveforms. Check the picture quality in the regular connection state.
11	9-PIN EXTENSION CABLE		• Installed between the main circuit board and capstan motor.
12	17-PIN EXTENSION CABLE		• Installed between the sensor and main circuit boards.

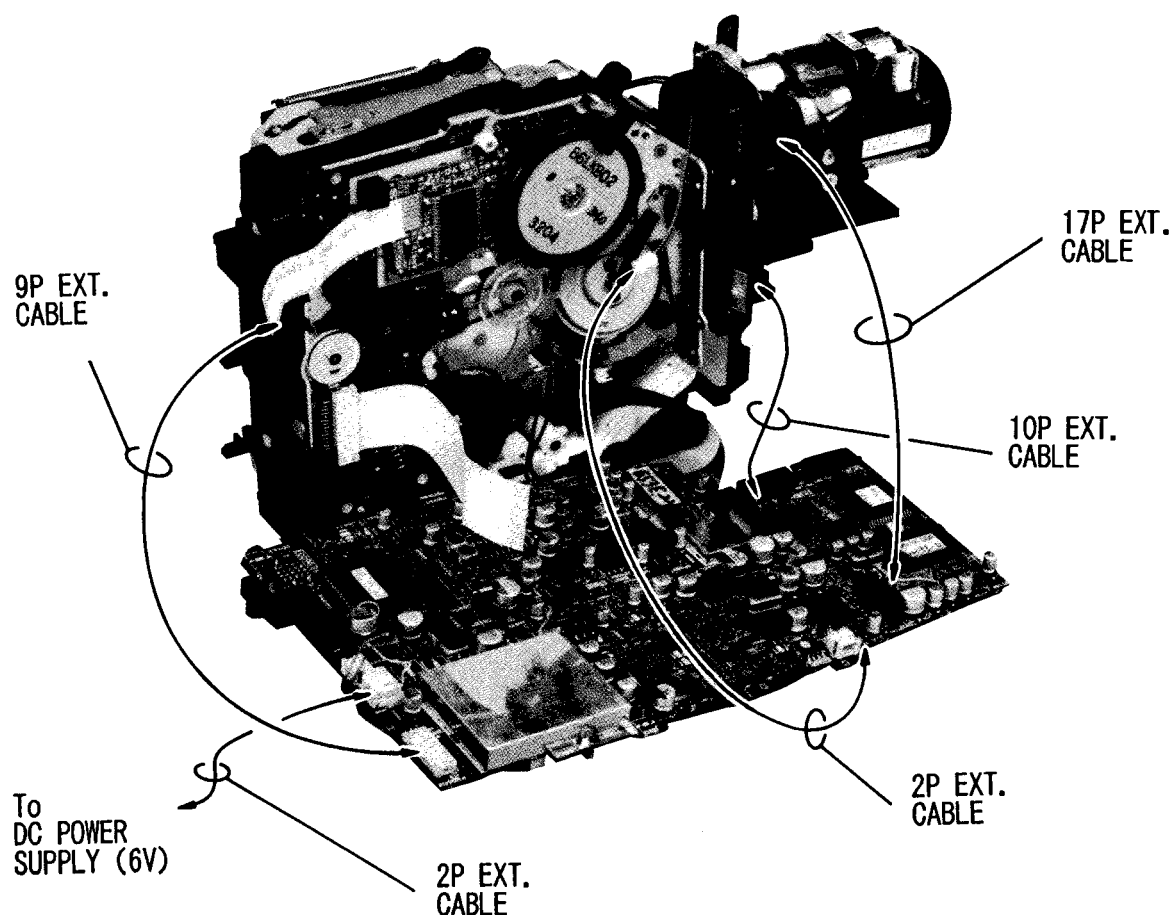


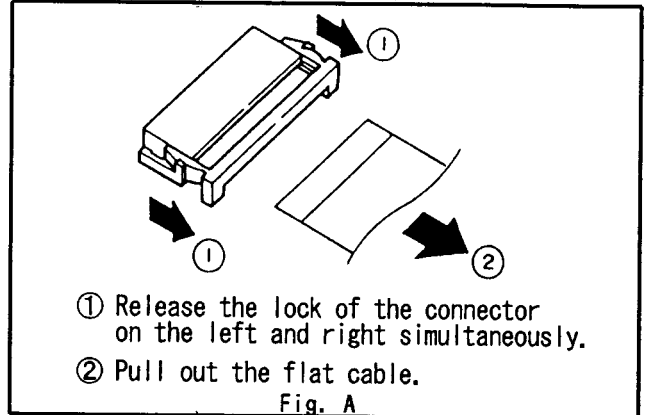
Fig. 1-1

DISASSEMBLY

CAUTION

1. When dismantling the lens block, never remove components other than the zoom motor, iris block, focus motor and flat cable of the lens.
2. Set the camera/recorder to the eject state before dismantling it. If the camera/recorder will not enter the eject state due to a defect, refer to "2. DISASSEMBLY METHOD WHEN TROUBLE OCCURS".
3. Disconnect flat cables from connectors by the procedure shown in Fig. A. Since many circuit boards in the camera/recorder are connected by in-board connectors, be sure to follow DISASSEMBLY when removing the circuit boards.

HOW TO DISCONNECT A FLAT CABLE



1. IDENTIFICATIONS OF MAJOR COMPONENTS

Numbers in () show the numbers of Figs. that describe how to remove the components.

1.1 Major Components and Circuit Boards

1.1.1 Main Block Section

- | | |
|------------------------------|-------|
| 1. Cassette Lid | (3-1) |
| 2. Left Case | (3-4) |
| 3. Top Cover | (3-1) |
| 4. Microphone (MIC) | (3-4) |
| 5. Camera Block | (3-4) |
| 6. Rubber Ring | (3-1) |
| 7. Lens Hood Holder | (3-1) |
| 8. Lens Hood | (---) |
| 9. Right Case Assembly | (3-1) |
| 10. Main Circuit Board | (3-5) |
| 11. VTR Frame | (3-5) |
| 12. Tape Transport Mechanism | (3-5) |

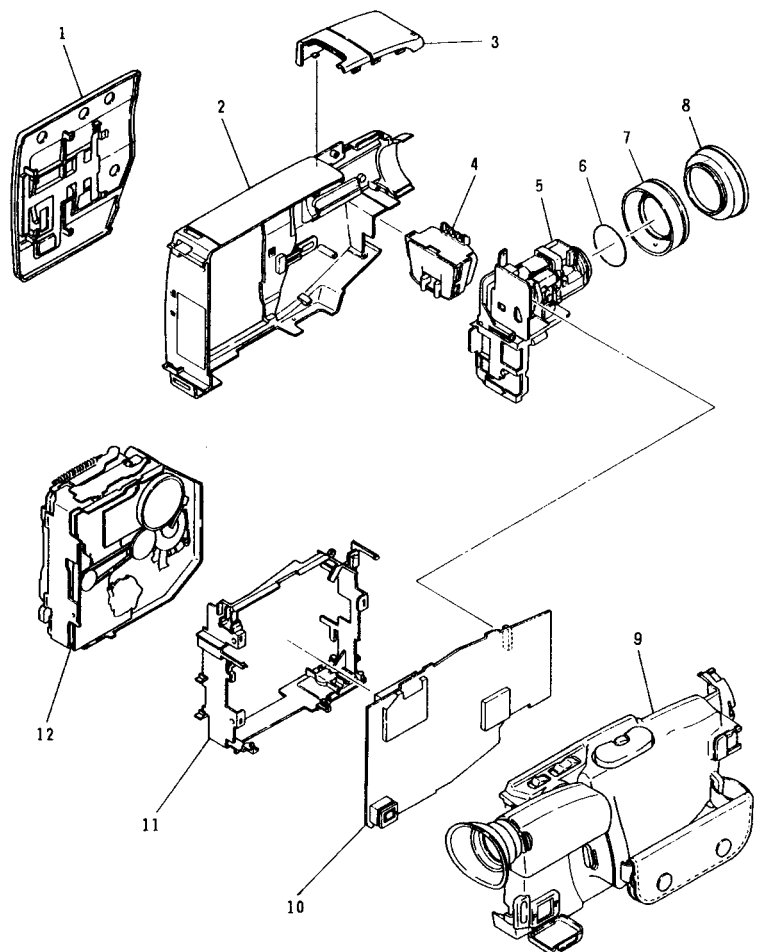


Fig. 1-1

1.1.2 Right Case Section

- | | |
|--------------------------------------|-------|
| 1. REC SW/Batt. Circuit Board | (3-3) |
| 2. T/W SW Unit | (3-3) |
| 3. Right Case | (3-3) |
| 4. DC Light Terminal | (3-3) |
| 5. Hand Strap | (3-3) |
| 6. AV Jack Cover | (3-3) |
| 7. Electronic Viewfinder (EVF) Block | (3-3) |

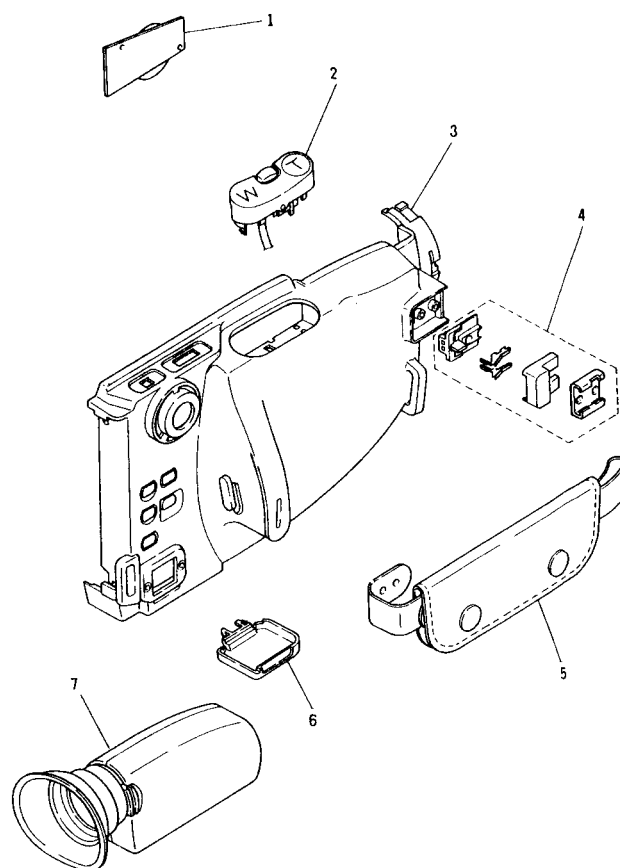


Fig. 1-2

1.1.3 Camera Block Section

- | | |
|-------------------------|-------|
| 1. Sensor Circuit Board | (3-6) |
| 2. Sensor Plate | (3-6) |
| 3. CCD Image Sensor | (3-6) |
| 4. Sensor Guide | (3-6) |
| 5. Sensor Rubber | (3-6) |
| 6. Crystal Filter | (3-6) |
| 7. Sensor Cover | (3-6) |
| 8. Lens Block | (3-6) |
| 9. Camera Frame | (3-3) |

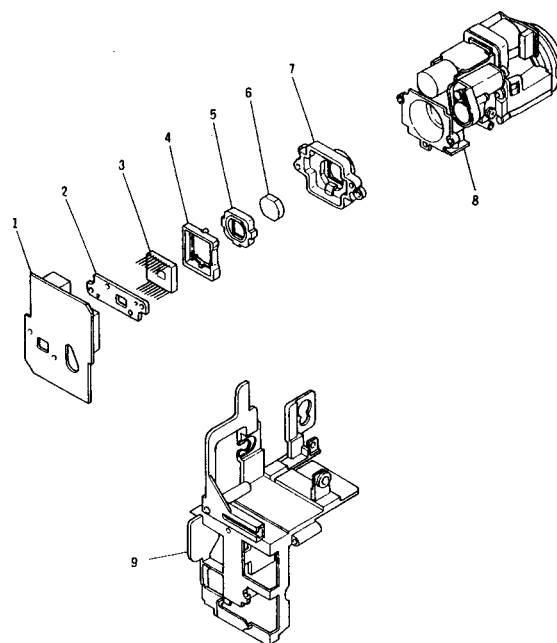


Fig. 1-3

1.1.4 Electronic Viewfinder (EVF) Section

1. EVF Left Case (3-7)
2. CRT Top Cover (3-7)
3. CRT (3-7)
4. Electronic Viewfinder (EVF) Circuit Board (3-7)
5. CRT Bottom Cover (3-7)
6. EVF Right Case (3-7)
7. Clear Cover (3-7)
8. EVF Lens (3-7)
9. Eye Cup (3-7)

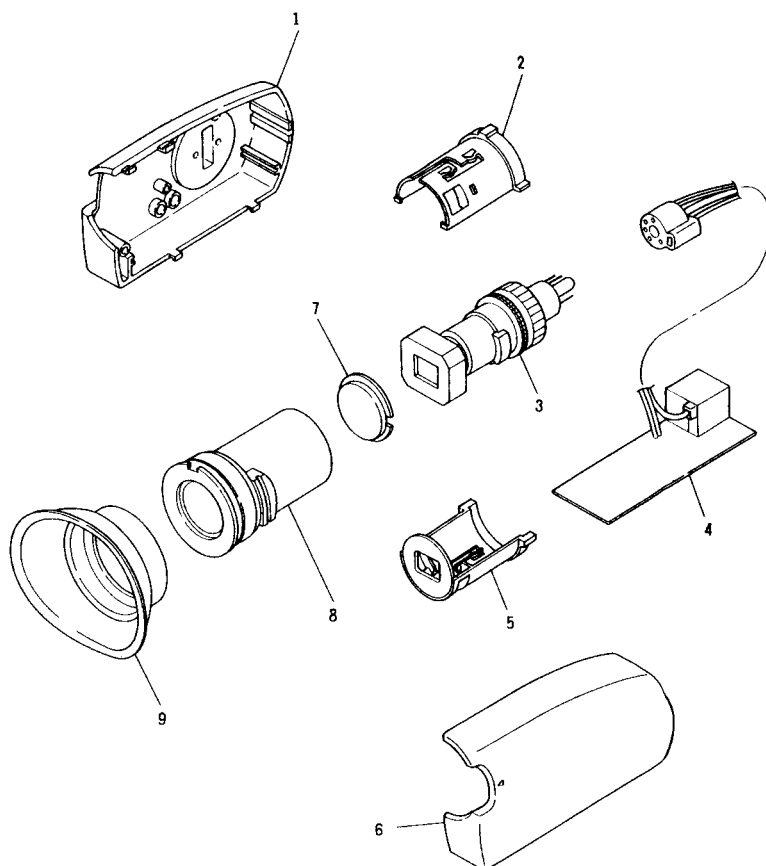


Fig. 1-4

1.1.5 Lens Section

1. Iris Block (3-8)
2. Focus Motor (3-8)
3. Lens (3-8)
4. Zoom Motor (3-8)
5. Position Sensor (3-8)
6. Lens Flat Cable (3-8)

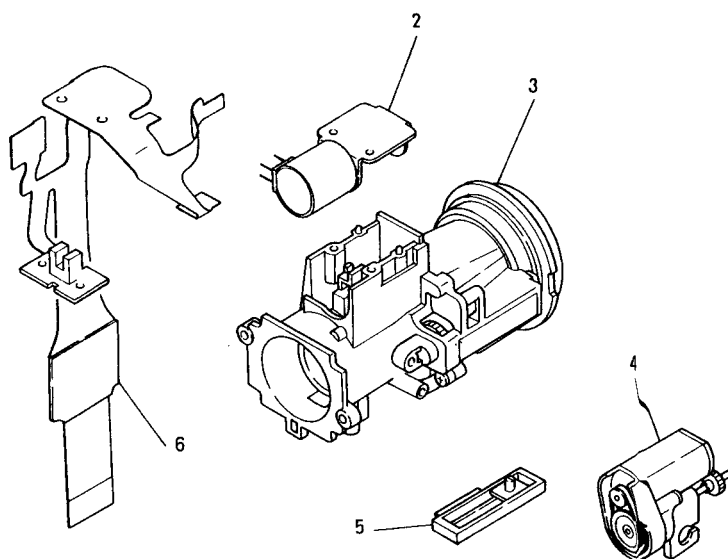


Fig. 1-5

1.2 Major Tape Transport Mechanism Components

1.2.1 Top View

- | | |
|---|----------|
| 1. Cylinder | (4-2) |
| 2. Capstan Motor | (4-1, 2) |
| 3. Loading Motor | (4-2) |
| 4. Pull-out Pole | (4-3, 4) |
| 5. Loading Gear (1) | (4-2) |
| 6. Loading Gear (2) | (4-2) |
| 7. Pressure Roller Cam Gear | (4-3, 4) |
| 8. Pressure Roller | (4-4) |
| 9. Loading Relay Gear (1) | (4-7) |
| 10. Take-up Reel Brake | (4-4) |
| 11. Eject Lock Drive Arm | (4-6) |
| 12. Take-up Reel Disk | (4-5) |
| 13. Reel Drive Idler | (4-6) |
| 14. Take-up Guide Roller | (4-5) |
| 15. Loading Relay Gear (3) | (4-7) |
| 16. Supply Reel Disk | (4-6) |
| 17. Supply Reel Brake | (4-6) |
| 18. Tension Band Holder
(Tension Band) | (4-6) |
| 19. Eject Arm | (4-6) |
| 20. Tension Spring | (4-6) |
| 21. Tension Arm | (4-6) |
| 22. Supply Guide Roller | (4-5) |
| 23. Impedance Roller | (4-5) |
| 24. Dew Sensor | (4-4) |

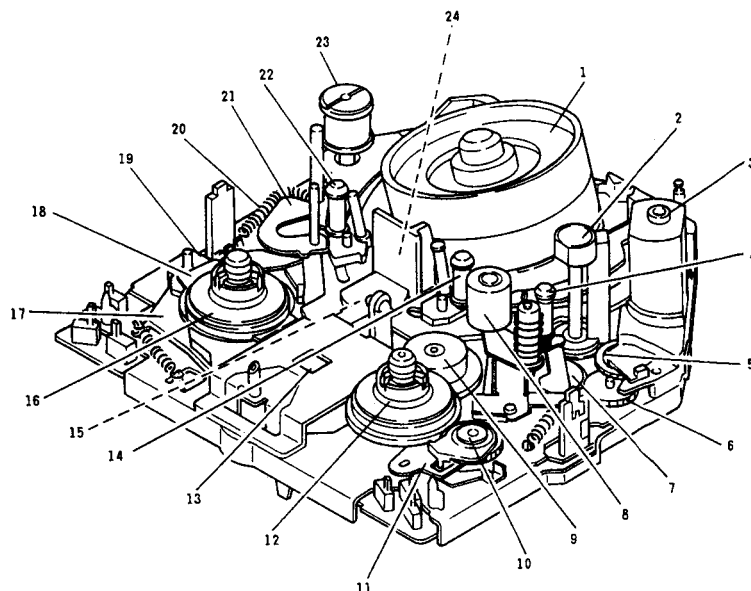


Fig. 1-6

1.2.2 Bottom View

- | | |
|-----------------------------------|----------|
| 1. Capstan Motor | (4-1, 2) |
| 2. Pulley Gear | (4-4) |
| 3. Static Discharge Brush | (4-2) |
| 4. Trouble Sensor Circuit Board | (4-4) |
| • End LED | |
| • Supply and Take-up End Sensors | |
| • Supply and Take-up Reel Sensors | |
| • Safety Tab Switch | |
| • Tape Select Switch | |
| • Cassette Holder Switch | |
| • Mechanism State Switch | |
| 5. Capstan Belt | (4-4) |
| 6. Centre Gear | (4-4) |

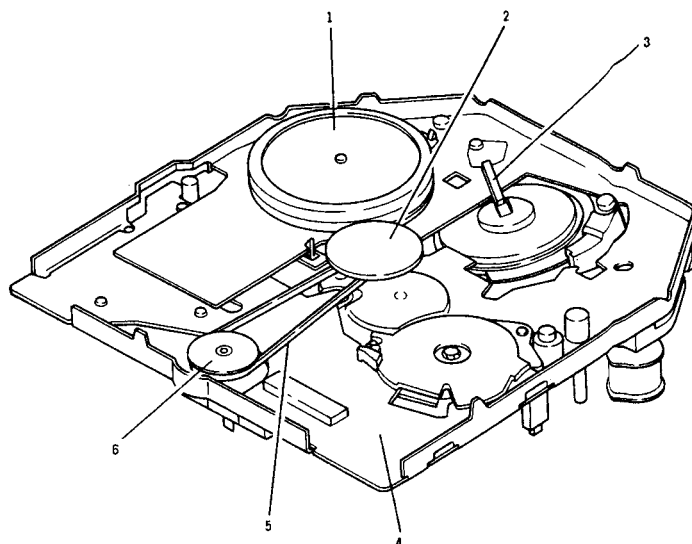


Fig. 1-7

2. HOW TO SET TO THE EJECT STATE MANUALLY

Note: This is not necessary for camera/recorders which are set to the eject state normally.

- 1) Lift the cassette lid in the direction of arrow (A) and insert tweezers between the cassette lid and left case. (Fig. 2-1)
- 2) Release two (2) tabs (C) of the plate spring in the cassette lid in the direction of arrows (B) and remove the cassette lid in the direction of arrow (D).

Note: If the electrical circuit is defective, connect a power supply directly to the loading motor that can be seen through hole (E) in the left case; the camera/recorder can be set to the eject state. (Fig. 2-2) Be careful of the following when supplying power.

- ① Set the power supply to 3-5 V DC. (Do not apply more than 5V as this could result in a secondary defect.)
- ② Connect the red wire to the positive terminal and the brown wire to the negative terminal to activate unloading. Connect the brown wire to the positive terminal and the red wire to the negative terminal to activate loading.
- 3) Remove the following parts in advance, referring to subsequent items.
 - Lens hood holder (Fig. 3-2)
 - Top cover (Fig. 3-2)
 - Open the right case (Fig. 3-2)
 - Main block (Fig. 3-4)
 - Main circuit board (Fig. 3-5)
 - VTR frame and tape transport mechanism (Fig. 3-5)
 - Loading motor (Fig. 4-2)
- 4) Turn the Loading Gear (1) in the direction of arrow (F) to unload. (Fig. 2-3)

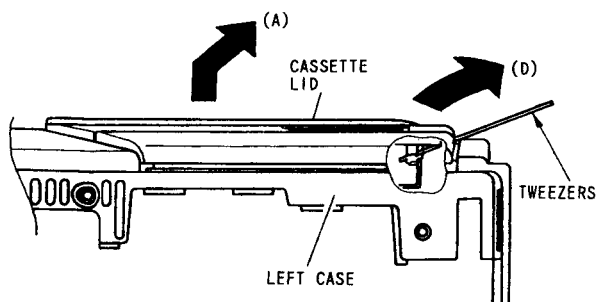


Fig. 2-1

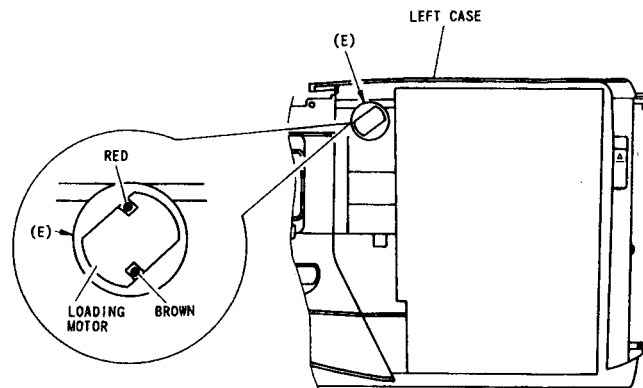


Fig. 2-2

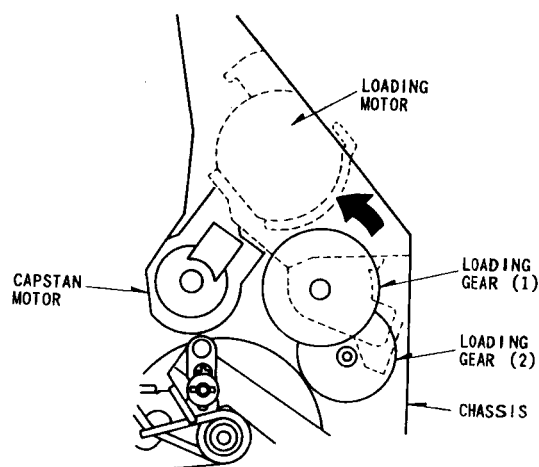
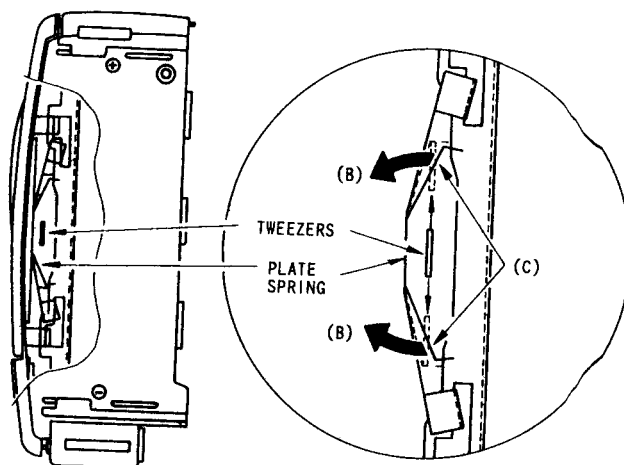


Fig. 2-3



3. NORMAL DISASSEMBLY METHOD

Perform the following to dismantle the camera/recorder if unloading is performed normally (the camera/recorder can be set to the eject state). If unloading cannot be done, refer to "2. HOW TO SET TO THE EJECT STATE MANUALLY".

3.1 CASES AND CIRCUIT BOARDS

3.1.1 Cassette Lid, Lens Hood Holder, Top Cover, and Right Case Removal

Note: Set the unit to the eject state and remove the lens cap from the lens hood.

A. Cassette Lid (Figs. 3-1, 3-2)

- 1) Release tabs of the plate spring on the cassette lid in the direction of the arrows. (Fig. 3-1)
- 2) Remove the cassette lid in the direction of the arrow. (Fig. 3-2)

B. Lens Hood Holder (Fig. 3-2)

- 1) Remove one (1) screw.
- 2) Turn the lens hood holder in the direction of the arrow.
- 3) Remove the lens hood holder in the direction of the arrow.

Note: The rubber ring is removed on its own when the lens hood holder is removed. Be sure to reinstall the rubber ring as show in Fig. 3-2.

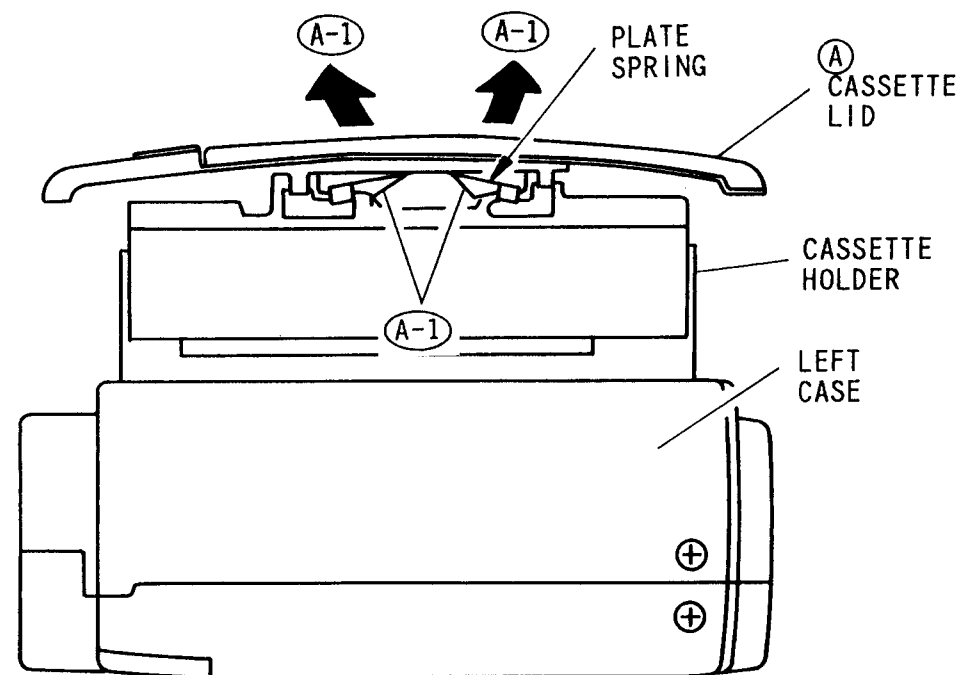


Fig. 3-1

C. Top Cover (Fig. 3-2)

Components to remove in advance Fig No. 3-2
• Lens Hood Holder

- 1) Remove the top cover in the direction of the arrow.

D. Open the Right Case (Fig. 3-2)

Components to remove in advance Fig No. 3-2
• Lens Hood Holder

- 1) Open the AV jack cover.
- 2) Remove six (6) screws.
- 3) Open the right case in the direction of the arrow.
- 4) Disconnect three (3) connectors and one (1) flat cable.

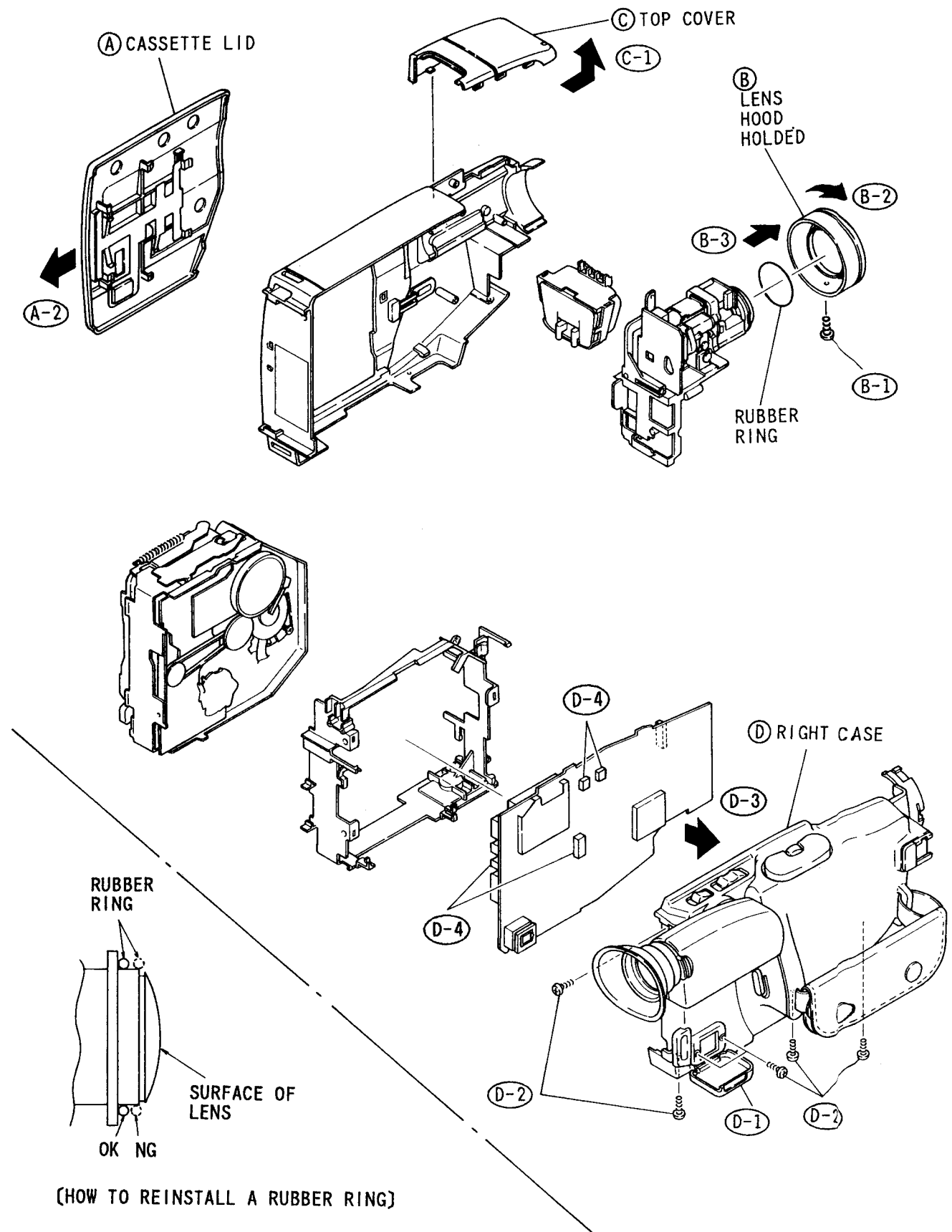


Fig. 3-2

3.1.2 Electronic Viewfinder (EVF) Block,
REC SW/Batt. Circuit Board, T/W SW Unit,
Accessory Shoe and DC Light Terminal,
Hand Strap, AV Jack Cover and Right Case
Removal

Components to remove in advance	Fig No.
• Lens Hood Holder	3-2
• Top Cover	3-2
• Open the right case	3-2

A. Electronic Viewfinder (EVF) Block (Fig. 3-3)

- 1) Remove two (2) screws.
 - 2) Remove the EVF in the direction of the arrow.
- Note: The EVF plate and plate spring are removed on their own when the EVF is removed.

B. REC SW/Batt. Removal (Fig. 3-3)

- 1) Remove two (2) screws.
 - 2) Remove the REC SW/Batt. circuit board in the direction of the arrow.
- Note: The lithium battery on the REC SW/Batt. circuit board can be recharged. It cannot be removed from the board.

C. T/W SW Unit (Fig. 3-3)

- 1) Release five (5) tabs.
- 2) Remove the T/W SW unit in the direction of the arrow.

D. Accessory Shoe and DC Light Terminal (Fig. 3-3)

- 1) Remove two (2) screws.
- 2) Remove the accessory shoe and DC light terminal in the direction of the arrow.

E. Hand Strap (Fig. 3-3)

Components to remove in advance	Fig No.
• REC SW/Batt. circuit Board	3-3

- 1) Remove two (2) screws.
- 2) Remove the hand strap from the strap holder on the right case.

F. AV Jack Cover and Right Case (Fig. 3-3)

Components to remove in advance	Fig No.
• EVF Block	3-3
• REC SW/Batt. Circuit Board	3-3
• T/W SW Unit	3-3
• Accessory Shoe and DC Light Terminal	3-3

- Note: Remove the EVF block, T/W SW unit, accessory shoe and DC light terminal only when removing the right case.
- 1) Remove the AV jack cover in the direction of the arrow.

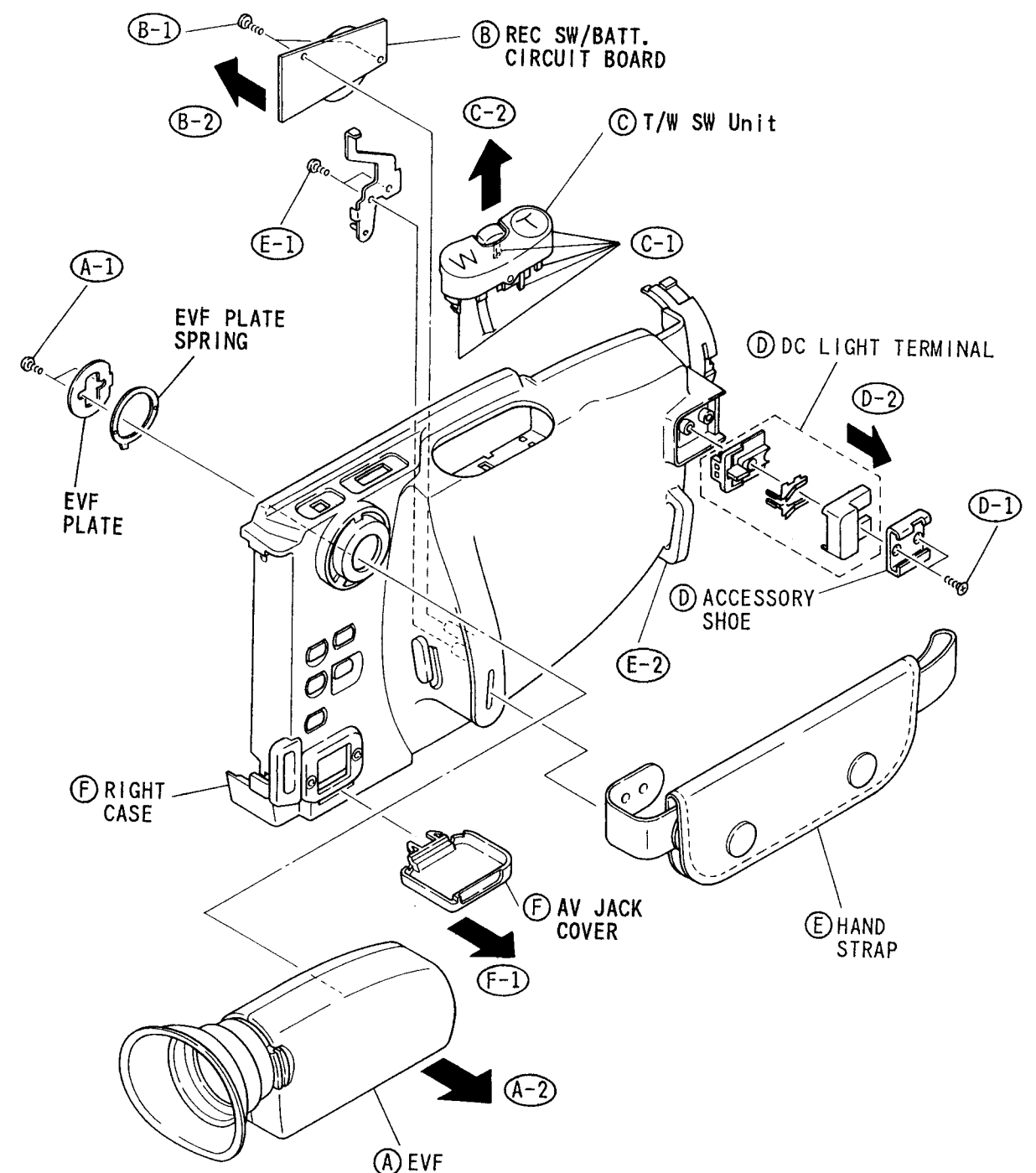


Fig. 3-3

3.1.3 Main Block (Main Circuit Board, VTR Frame, Tape Transport Mechanism), Camera Block, Microphone (MIC) and Left Case Removal

Components to remove in advance	Fig No.
• Cassette Lid	3-1, 2
• Lens Hood Holder	3-2
• Top Cover	3-2
• Open the right case	3-2

A. Main Block (Main Circuit Board, VTR Frame, Tape Transport Mechanism) (Fig. 3-4)

- 1) Remove three (3) screws.
- 2) Remove one (1) screw.
- 3) Disconnect three (3) connectors and one (1) flat cable.
- 4) Remove the main block in the direction of the arrow. (The main block (main circuit board) and camera block (sensor circuit board) are connected via a board-in type connector.)

Note: Be careful as the screw plate can be removed easily from the VTR frame when the main block has been removed.

B. Camera Block (Fig. 3-4)

Components to remove in advance	Fig No.
• Main Block	3-4

- 1) Remove three (3) screws.
- 2) Remove the camera block in the direction of the arrow.

C. Microphone (MIC) and Left Case (Fig. 3-4)

Components to remove in advance	Fig No.
• Main Block	3-4

- 1) Remove one (1) screw.
- 2) Remove the MIC in the direction of the arrow.

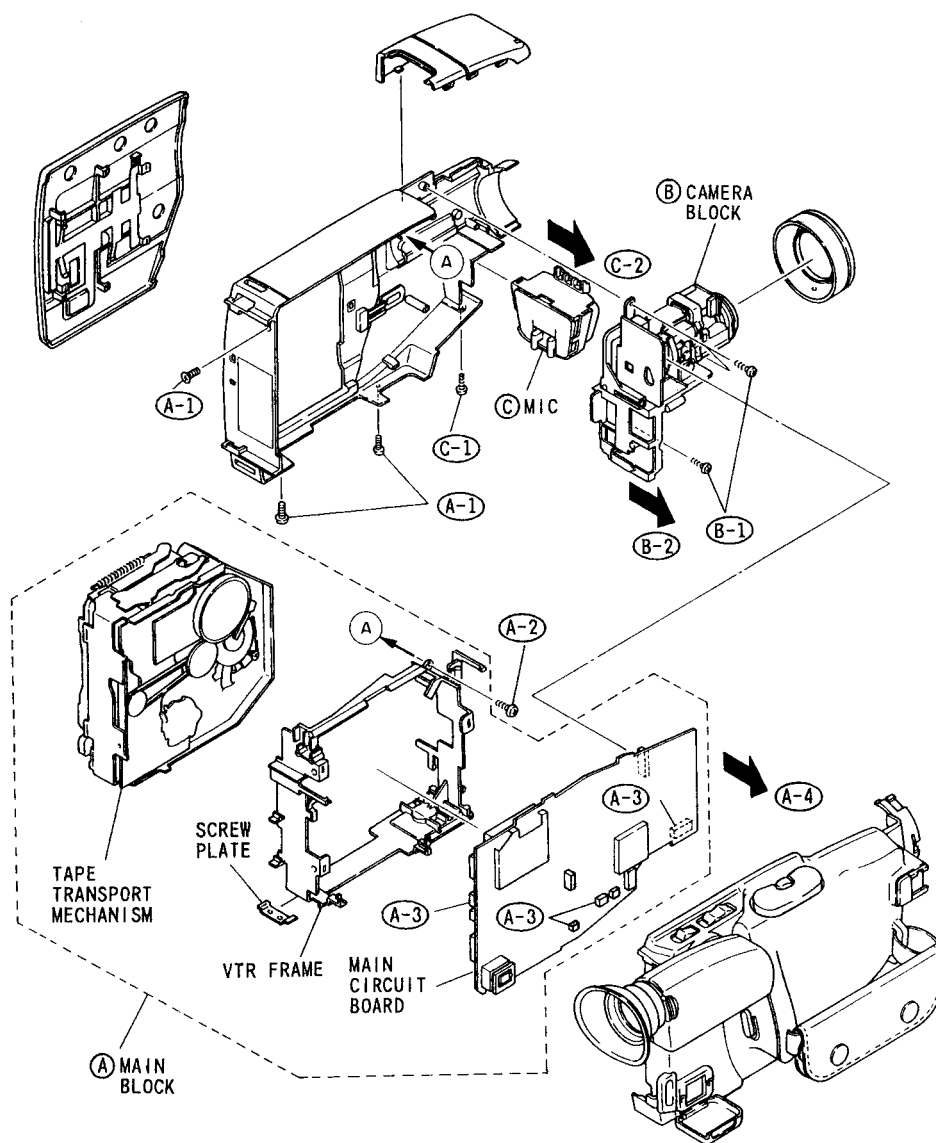


Fig. 3-4

3.1.4 Main Circuit Board, VTR Frame and Tape Transport Mechanism Removal

Components to remove in advance	Fig No.
• Cassette Lid	3-1, 2
• Lens Hood Holder	3-2
• Top Cover	3-2
• Open the right case	3-2
• Main Block	3-4

A. Main Circuit Board (Fig. 3-5)

- 1) Disconnect two (2) connectors and four (4) flat cables.
- 2) Remove one (1) screw.
- 3) Release four (4) tabs.

B. VTR Frame and Tape Transport Mechanism (Fig. 3-5)

Components to remove in advance	Fig No.
• Main Circuit Board	3-5

- 1) Remove one (1) screw.
- 2) Release three (3) engaged sections.
- 3) Remove the VTR frame in the direction of the arrow.

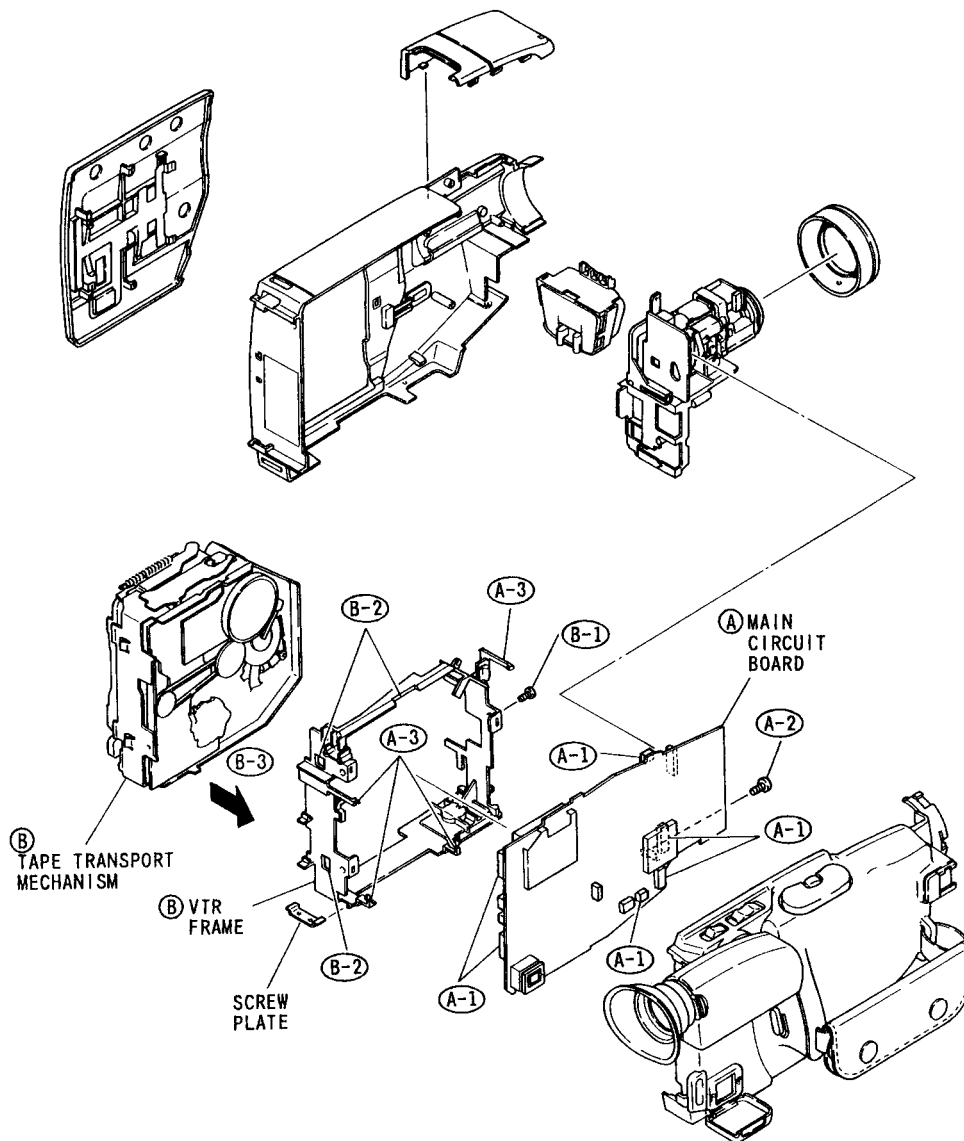


Fig. 3-5

3.1.5 Camera Frame, Lens Block and Sensor Circuit Board Removal

Components to remove in advance Fig No.

- Cassette Lid 3-1, 2
- Lens Hood Holder 3-2
- Top Cover 3-2
- Open the right case 3-2
- Main Block 3-4
- Camera Block 3-4

A. Camera Frame (Fig. 3-6)

- 1) Remove three (3) screws.
- 2) Widen a section of the camera frame that is engaged with the lens slightly and remove the camera frame.

B. Lens Block (Fig. 3-6)

Components to remove in advance Fig No.

- Camera Frame 3-6

- 1) Remove two (2) screws.
- 2) Remove the lens block.

C. Sensor Circuit Board (Fig. 3-6)

Components to remove in advance Fig No.

- Camera Frame 3-6
- Lens Block 3-6

- 1) Remove two (2) screws.
- 2) Remove the sensor cover.

Note: When the sensor cover is removed, the crystal filter and sensor rubber are removed on their own. Be careful not to damage the crystal filter.

- 3) Remove the sensor guide and unsolder sixteen (16) points on the circuit board (terminals of the CCD image sensor).
- 4) Remove two (2) screws.

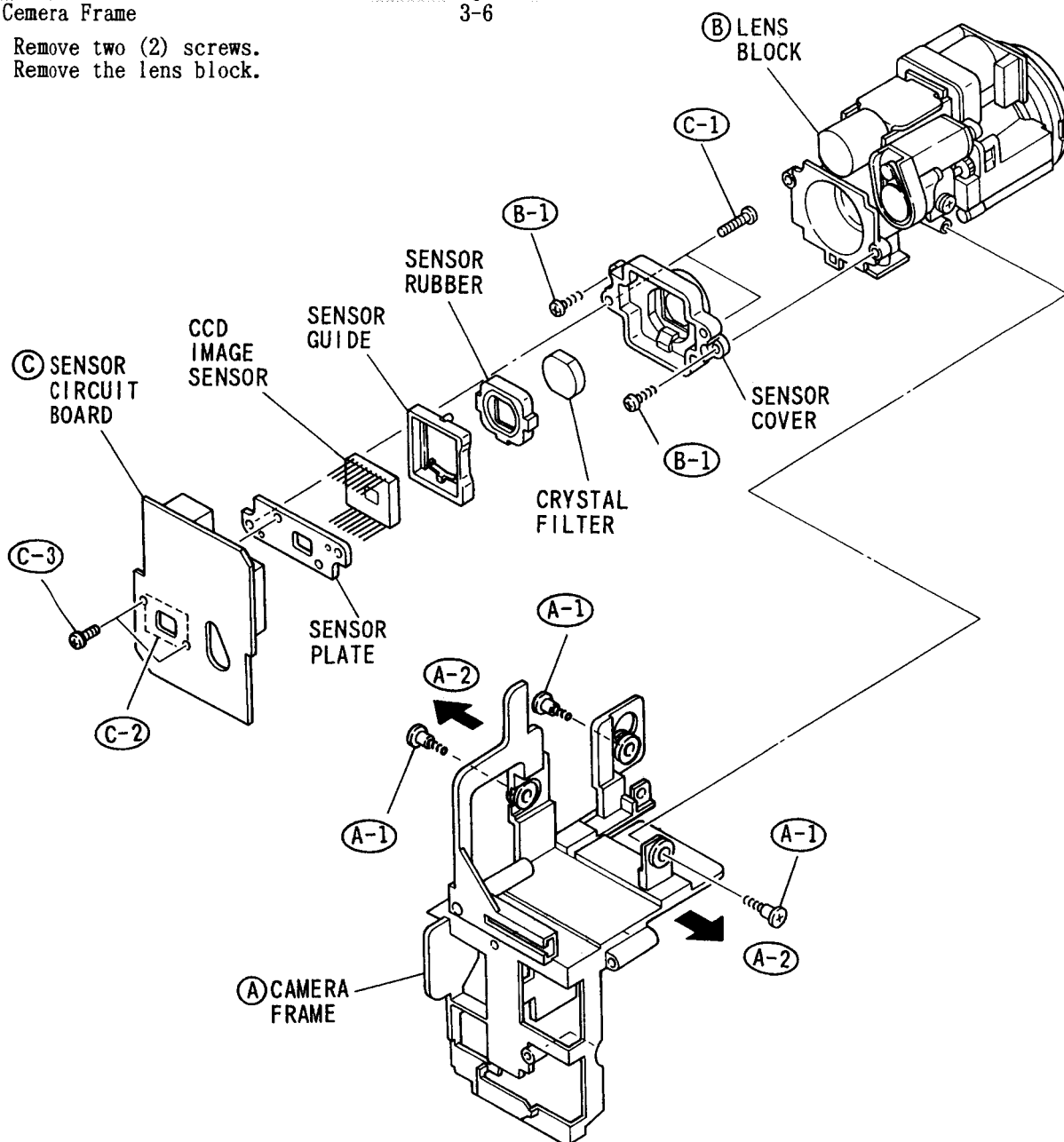


Fig. 3-6

3.2 ELECTRONIC VIEWFINDER (EVF) BLOCK

Note: Remove the EVF block in advance.

3.2.1 EVF Lens Block, EVF Left Case, EVF Right Case, EVF Circuit Board and CRT Removal

A. EVF Lens Block (Fig. 3-7)

- 1) Turn the EVF lens block in the direction of the arrow.
- 2) Remove the EVF lens block in the direction of the arrow.

B. EVF Left Case (Fig. 3-7)

- 1) Remove two (2) screws.
- 2) Remove the left case from the right case in the direction of the arrow.

C. EVF Right Case (Fig. 3-7)

Components to remove in advance Fig No. 3-7

- EVF Left Case

- 1) Remove the EVF circuit board and CRT from the right case in the direction of the arrow.

D. EVF Circuit Board (Fig. 3-7)

Components to remove in advance Fig No. 3-7

- EVF Left Case
- EVF Right Case

1. Disconnect connector and CRT socket.

E. CRT (Fig. 3-7)

Components to remove in advance Fig No. 3-7

- EVF Left Case
- EVF Right Case
- EVF Circuit Board

- 1) Release two (2) tabs.

Note: When the CRT top and bottom covers are removed, the clear cover is removed on its own. Be careful not to damage the clear cover.

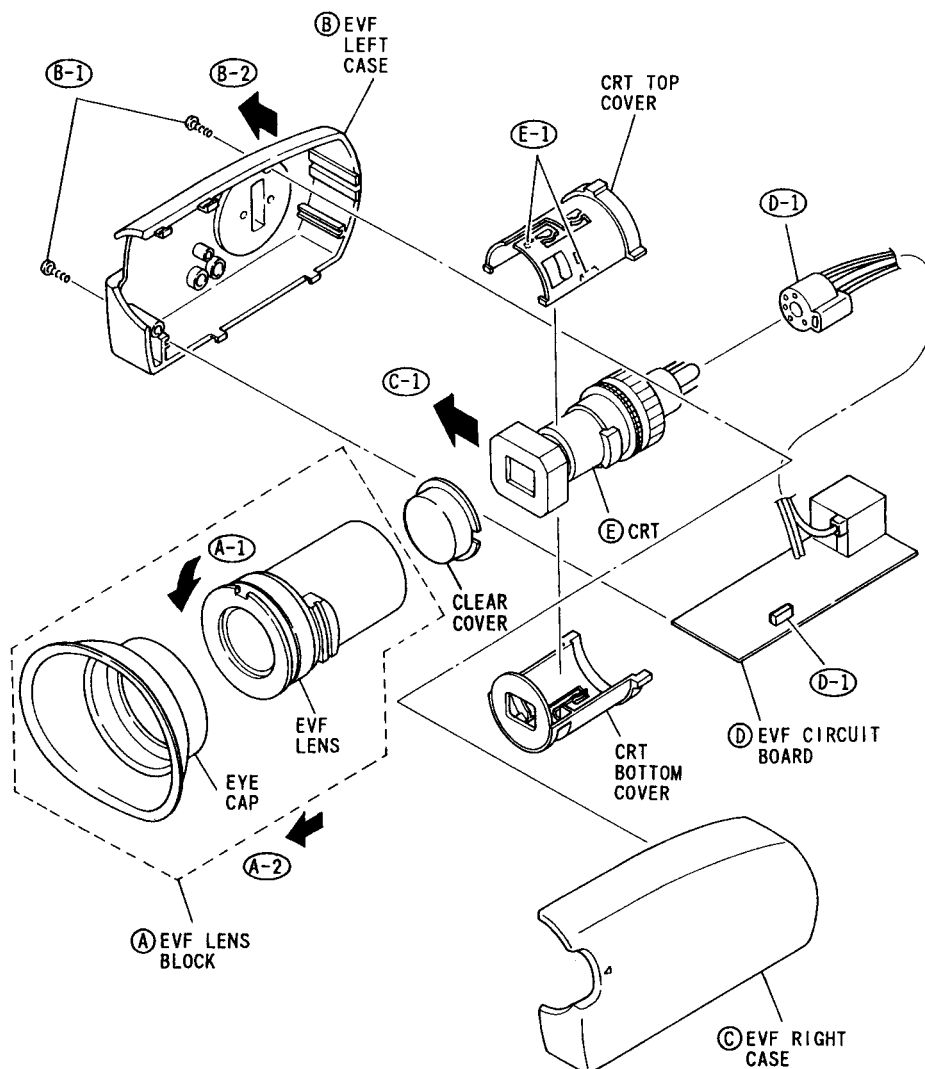


Fig. 3-7

3.3 LENS BLOCK

Note: Remove the lens block in advance.

3.3.1 Focus Motor, Zoom Motor, Iris Block, Position Sensor and Lens Flat Cable Removal

Note: Be careful not to damage the lens flat cable.

A. Focus Motor (Fig. 3-8)

- 1) Unsolder four (4) points.
- 2) Remove two (4) screws.
- 3) Remove the focus motor from the lens.

B. Zoom Motor (Fig. 3-8)

- 1) Remove one (1) screw.
- 2) Unsolder two (2) points.

C. Iris Block (Fig. 3-8)

- 1) Disconnect one (1) flat cable.
- 2) Remove one (1) screw.
- 3) Remove the iris block in the direction of the arrow.

Note: Be careful not to damage the iris blades. Also take care that foreign matter such as dust, etc. does not adhere to the iris blades.

D. Position Sensor (Fig. 3-8)

- 1) Remove one (1) screw.
- 2) Unsolder two (2) points.

E. Lens Flat Cable (Fig. 3-8)

Components to remove in advance Fig No.

- Focus Motor 3-8
- Zoom Motor 3-8
- Position Sensor 3-8

- 1) Disconnect one (1) flat cable.

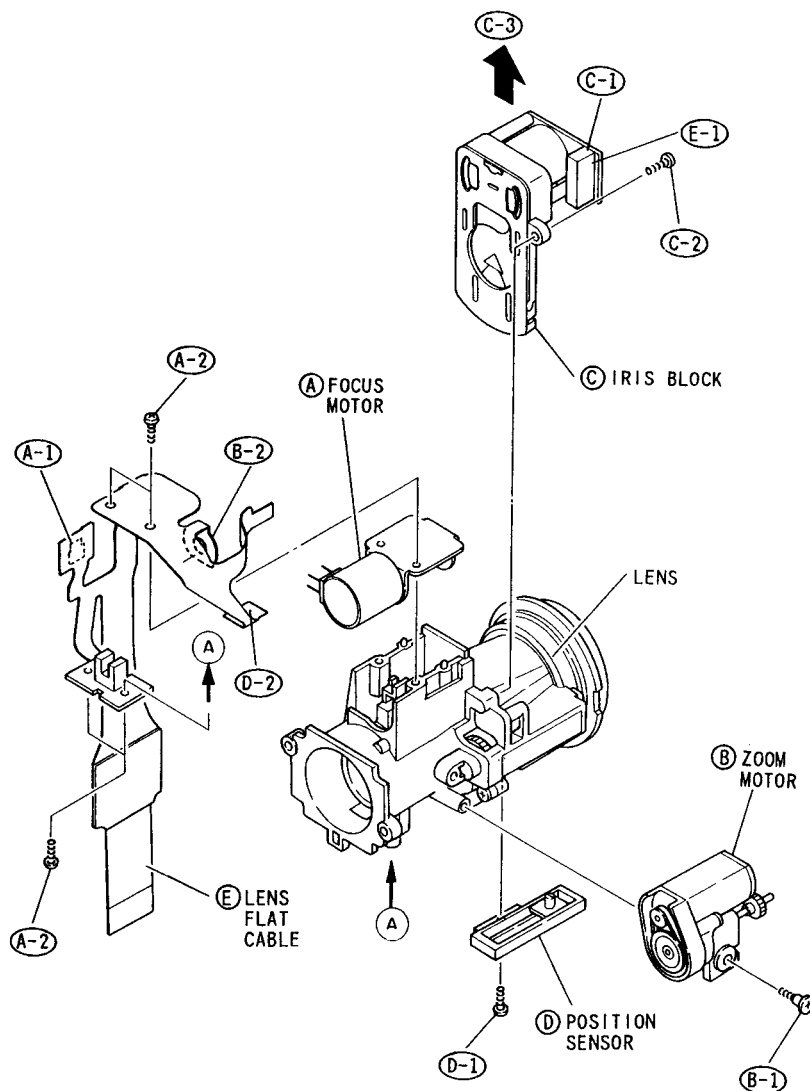


Fig. 3-8

4. TAPE TRANSPORT MECHANISM DISASSEMBLY

Note 1: Remove the tape transport mechanism in advance.

Note 2: Dismantle and reinstall the tape transport mechanism in the unloading/stop mode.

4.1 Cassette Holder, Motors, Sensors and Circuit Boards

4.1.1 Cassette Holder, Static Discharge Brush, Cylinder, Loading Motor, Loading Gears (1) and (2), Capstan Motor and Tape Cover Removal

A. Cassette Holder (Fig. 4-2)

1) Move the eject lever in the direction of the arrow and set the unit to the eject state.

2) Remove four (4) screws.

Note: Reinstall the cassette holder so that section (b) of the eject lock slider is inserted into section (a) of the eject lock arm.

B. Static Discharge Brush (Fig. 4-2)

1) Remove one (1) screw.

C. Cylinder (Fig. 4-2)

1) Remove two (2) screws.

2) Remove the cylinder in the direction of the arrow.

Note 1: Take care as the spring can be removed on its own when screw (c) holding the cylinder is removed.

Note 2: Do not touch video head tips with your fingers or tools, etc. during work.

Note 3: After reinstalling the cylinder, be sure to perform the following adjustment.

• 5. ADJUSTMENTS AFTER REPLACING THE CYLINDER in CHAPTER 3

D. Loading Motor, Loading Gears (1) and (2) (Fig. 4-2)

Note: Although the loading motor can be removed with the cassette holder attached, it is better to remove the holder to make the work easier.

1) Remove two (2) screws.

2) Remove the loading motor and loading gears (1) and (2) in the direction of the arrow.

Note: Perform the following adjustments after reinstalling the loading motor and loading gears (1) and (2).

• 3. PHASE MATCHING ASSEMBLY in CHAPTER 3

E. Capstan Motor (Figs. 4-1, 4-2)

⊗⊗⊗ Components to remove in advance ⊗⊗⊗ Fig No. ⊗

• Loading Motor and Loading Gears (1) and (2) 4-2

1) Remove three (3) screws. (See Fig. 4-2)

2) Release three (3) tabs. (See Fig. 4-1)

3) Remove the capstan motor in the direction of the arrow.

F. Tape Cover (Fig. 4-2)

1) Release two (2) tabs.

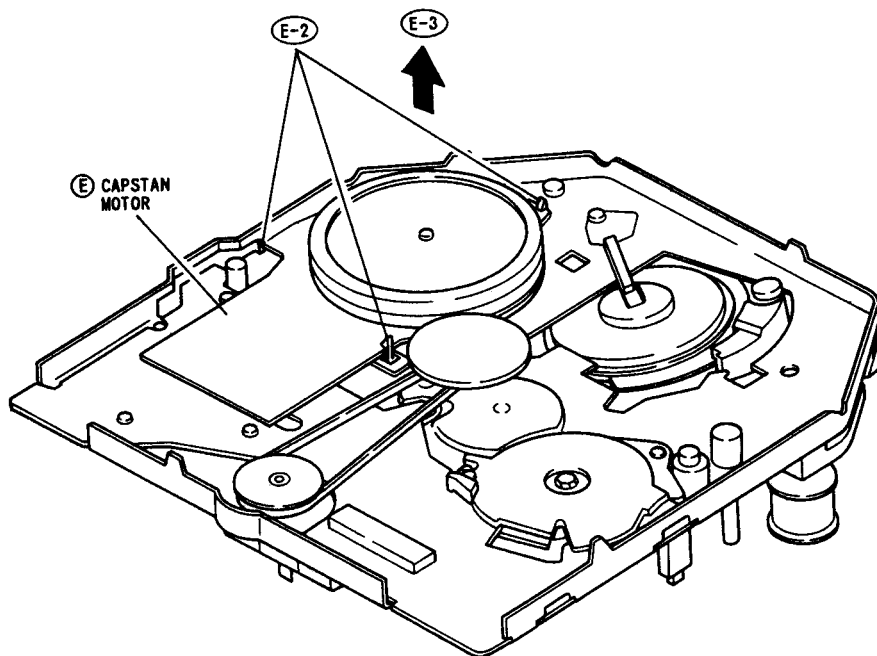


Fig. 4-1

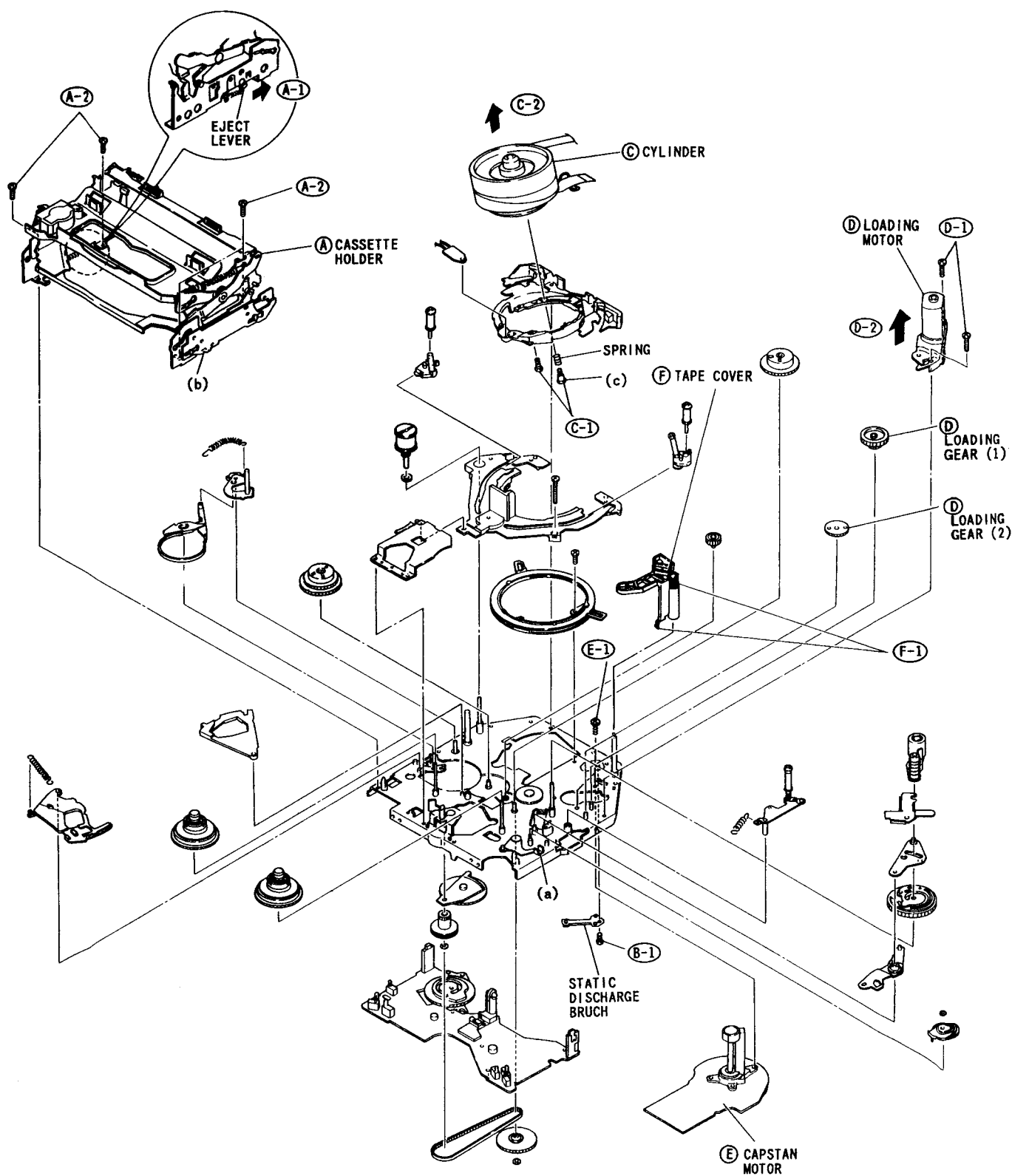


Fig. 4-2

4.1.2 Pulley Gear, Centre Gear, Capstan Belt, Trouble Sensor Circuit Board, Dew Sensor, Pressure Roller, Pull-Out Pole, Pressure Roller Drive Arm, Pressure Roller Cam Gear and Take-up Reel Brake Removal

A. Pulley Gear, Centre Gear and Capstan Belt (Fig. 4-4)

Components to remove in advance Fig No.

- Loading Motor and Loading Gears (1) and (2) 4-2
- Capstan Motor 4-1,2
- 1) Remove one (1) washer.
- 2) Remove one (1) washer.
- 3) Remove the centre gear and pulley gear together with the capstan belt.

B. Trouble Sensor Circuit Board (Fig. 4-4)

Components to remove in advance Fig No.

- Loading Motor and Loading Gears (1) and (2) 4-2
- Capstan Motor 4-1,2
- Pulley Gear, Centre Gear and Capstan Belt 4-4

Note: The following sensors and switches are installed on the trouble sensor circuit board.

- End LED
- Supply and Take-up End Sensors
- Supply and Take-up Reel Sensors
- Safety Tab Switch
- Tape Select Switch
- Cassette Holder Switch
- Mechanism State Switch

- 1) Remove the five (5) screws.

Note: Perform the following adjustments after reinstalling the trouble sensor circuit board.

- 3. PHASE MATCHING ASSEMBLY in CHAPTER 3

C. Dew Sensor (Fig. 4-4)

Note: Although the dew sensor can be removed with the cassette holder attached (in the eject state), it is better to remove the holder to make the work easier.

- 1) Remove one (1) screw.

D. Pressure Roller (Fig. 4-4)

Components to remove in advance Fig No.

- Cassette Holder 4-2
- 1) Remove one (1) washer.
- 2) Pull out the pressure roller from the pressure roller shaft.

Note 1: Reinstall the pressure roller so that pin (a) of the pressure roller drive arm is inserted into groove (b) in the pressure roller.

Note 2: Do not remove the spring of the pressure roller.

E. Pull-Out Pole, Pressure Roller Drive Arm and Pressure Roller Cam Gear (Figs. 4-3, 4-4)

Components to remove in advance Fig No.

- Cassette Holder 4-2
- Pressure Roller 4-4

- 1) Remove one (1) screw. (See Fig. 4-4)
- 2) Move the pressure roller plate in the direction of the arrow and remove the pressure roller plate.
- 3) Remove the spring.

Note 1: Reinstall the pull-out pole so that pin (a) of this pole is inserted into groove (b) in the surface of the pressure roller cam gear. (See Figs. 4-3, 4-4)

Note 2: Reinstall the pressure roller drive arm so that pin (c) of this arm is inserted into groove (d) in the surface of the pressure roller cam gear. (See Figs. 4-3, 4-4)

Note 3: Reinstall the pressure roller cam gear so that pin (e) of the cassette holder lock arm is inserted into groove (f) on the back of the pressure roller cam gear. (See Figs. 4-3, 4-4)

F. Take-up Reel Brake (Fig. 4-4)

Components to remove in advance Fig No.

- Cassette Holder 4-2
- 1) Remove one (1) washer.

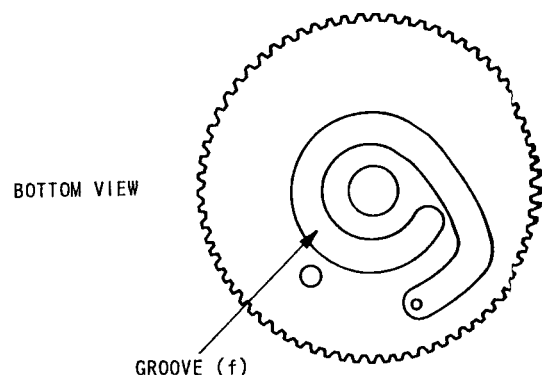
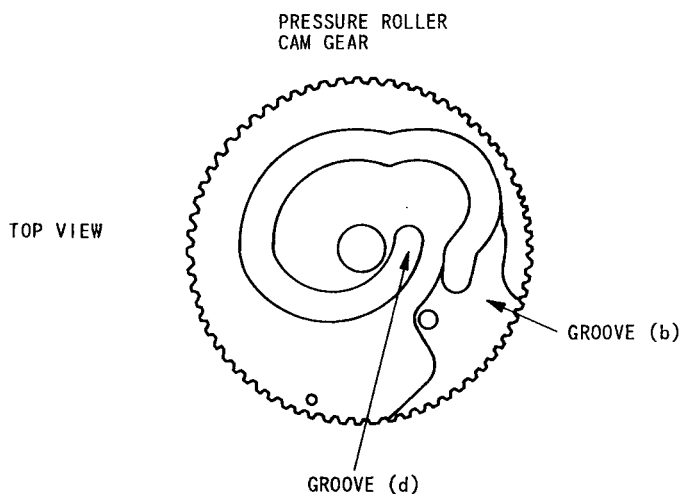


Fig. 4-3

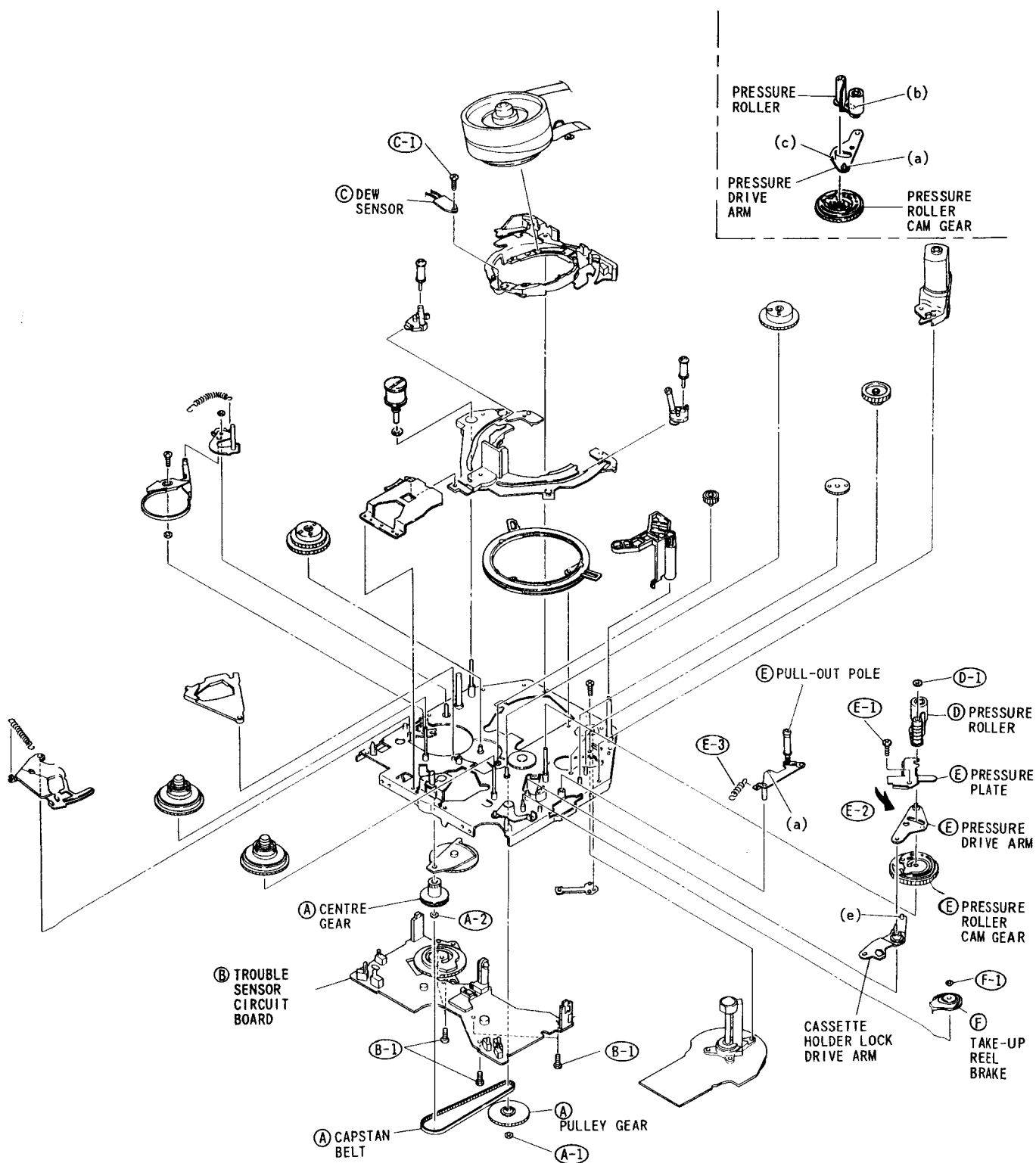


Fig. 4-4

4.2 Others Parts

4.2.1 Supply Guide Roller, Take-up Guide Roller, Impedance Roller, Chassis Plate and Take-up Reel Disk Removal

Components to remove in advance Fig No. 4-2
• Cassette Holder

A. Supply Guide Roller (Fig. 4-5)

- 1) Loosen one (1) screw.
- 2) Use the special screwdriver (to adjust the guide roller) to turn the top of the supply guide roller counterclockwise.

Note: Perform the following adjustment after reinstalling the supply guide roller.
• 4.4 Supply/Take-up Guide Roller Height Adjustment

B. Take-up Guide Roller (Fig. 4-5)

- 1) Loosen one (1) screw.
- 2) Use the special screwdriver (to adjust the guide roller) to turn the top of the take-up guide roller counterclockwise.

Note: Perform the following adjustment after reinstalling the take-up guide roller.
• 4.4 Supply/Take-up Guide Roller Height Adjustment

C. Impedance Roller (Fig. 4-5)

- 1) Use a flat-bladed screwdriver to turn the top of the impedance roller counterclockwise to remove it.

Note: Perform the following adjustment after reinstalling the impedance roller.
• 4.3 Pull-out Pole and Impedance Roller Height Check/Adjustment

D. Chassis Plate (Fig. 4-5)

1. Remove three (3) screws.

E. Take-up Reel Disk (Fig. 4-5)

Components to remove in advance Fig No. 4-5
• Chassis Plate

- 1) Pull out the take-up reel disk from the take-up reel disk shaft.

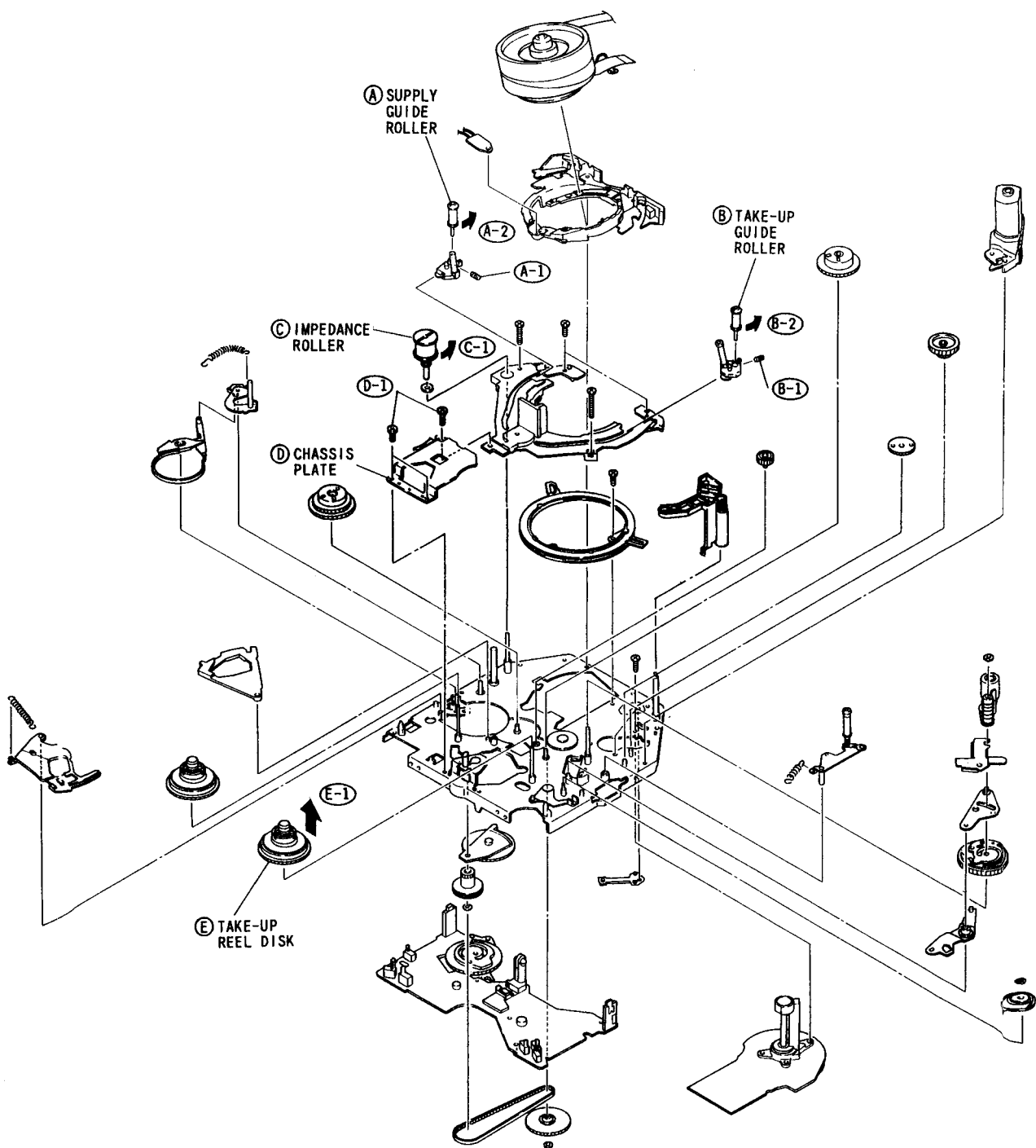


Fig. 4-5

4.2.2 Eject Lock Drive Arm, Tension Arm, Tension Band, Supply Reel Disk, Eject Arm, Supply Reel Brake Reel Drive Idler and Cylinder Base Removal

Components to remove in advance Fig No.
 • Cassette Holder 4-2

A. Eject Lock Drive Arm (Fig. 4-6)

Components to remove in advance Fig No.
 • Pressure Roller 4-4
 • Pull-out Pole, Pressure Roller Drive Arm and Pressure Roller Cam Gear 4-4
 • Take-up Reel Brake 4-4
 • Chassis Plate 4-5
 • Take-up Reel Disk 4-5

- 1) Remove the eject lock drive arm from the eject lock arm. (See Fig. 4-6)

Note: Reinstall the eject lock drive arm so that pin (b) of the eject lock arm is inserted into hole (a) in the eject lock drive arm.

B. Tension Arm and Tension Band (Fig. 4-6)

Components to remove in advance Fig No.
 • Chassis Plate 4-5
 • Take-up Reel Disk 4-5

- 1) Remove the tension spring from the chassis and tension arm.
- 2) Remove one (1) screw.
- 3) Remove one (1) washer.
- 4) Release two (2) tabs and remove the tension band from the tension arm.

Note: Perform the following adjustment after reinstalling the tension arm and tension band.

- 4.1 Tension Pole Position/Tension Torque Adjustments

C. Supply Reel Disk and Eject Arm (Fig. 4-6)

Components to remove in advance Fig No.
 • Chassis Plate 4-5
 • Take-up Reel Disk 4-5
 • Tension Arm and Tension Band 4-6

- 1) Pull out the supply reel disk from the supply reel disk shaft.
- 2) Remove the eject arm.

Note: Reinstall the eject arm so that pin (c) of the arm is inserted into groove (d) in the mechanism state switch.

D. Supply Reel Brake (Fig. 4-6)

Components to remove in advance Fig No.
 • Chassis Plate 4-5
 • Take-up Reel Disk 4-5
 • Tension Arm and Tension Band 4-6

- 1) Remove the spring between the supply reel brake and chassis.
- 2) Remove the supply reel brake.

E. Reel Drive Idler (Fig. 4-6)

Components to remove in advance Fig No.
 • Loading Motor and Loading Gears (1) and (2) 4-2
 • Capstan Motor 4-2
 • Pulley Gear, Centre Gear and Capstan Belt 4-4
 • Chassis Plate 4-5
 • Take-up Reel Disk 4-5
 • Tension Arm and Tension Band 4-6
 • Supply Reel Disk and Eject Arm 4-6
 • Supply Reel Brake 4-6

- 1) Remove the reel drive idler in the direction of the arrow.

Note: When removing the reel drive idler, take care not to lose the washer between the idler and chassis.

F. Cylinder Base (Fig. 4-6)

Components to remove in advance Fig No.
 • Static Discharge Brush 4-2
 • Cylinder 4-2
 • Tape Cover 4-2
 • Dew Sensor 4-4

- 1) Remove three (3) screws.

Note: The cylinder base can be removed from the chassis with the cylinder attached.

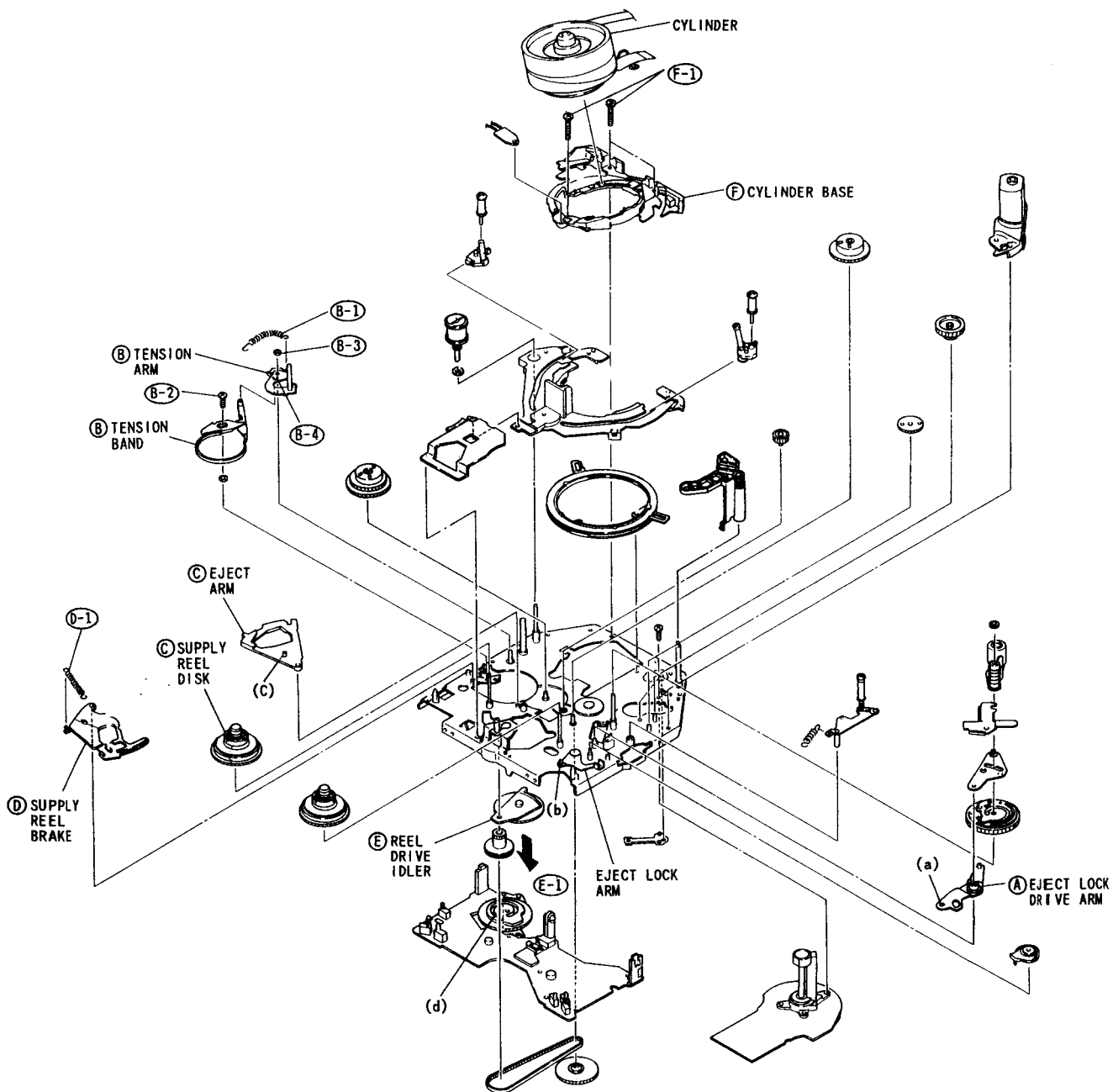


Fig. 4-6

4.2.3 Guide Roller Rail, Supply and Take-up Guide Roller Bases, Loading Relay Gears (1), (2), Take-up and Supply Loading Rings and Loading Relay Gear (3) Removal

Components to remove in advance	Fig No.
• Cassette Holder	4-2
• Tape Cover	4-2
• Dew Sensor	4-4
• Pressure Roller	4-4
• Supply Guide Roller	4-5
• Take-up Guide Roller	4-5
• Impedance Roller	4-5
• Chassis Plate	4-5
• Take-up Reel Disk	4-5
• Tension Arm and Tension Band	4-6
• Cylinder Base (with the cylinder attached)	4-6

Note 1: It is not necessary to remove the supply and take-up guide rollers when removing only the guide roller rail or when removing the guide roller bases with the guide rollers assembled.

Note 2: The cylinder base can be removed from the chassis with the cylinder attached.

A. Guide Roller Rail (Fig. 4-7)

- 1) Remove two (2) screws.
- 2) Remove the guide roller rail and guide roller bases from the chassis.

Note: Perform the following adjustment after reinstalling the guide roller rail.
• 4.4 Supply/Take-up Guide Roller Height Adjustment

B. Supply Guide Roller Base (Fig. 4-7)

Components to remove in advance	Fig No.
• Guide Roller Rail	4-7

- 1) Remove the supply guide roller base along the groove in the rail in the direction of the arrow.

Note: Perform the following adjustment after reinstalling the supply guide roller base.
• 4.4 Supply/Take-up Guide Roller Height Adjustment

C. Take-up Guide Roller Base (Fig. 4-7)

Components to remove in advance	Fig No.
• Guide Roller Rail	4-7

- 1) Remove the take-up guide roller base along the groove in the rail in the direction of the arrow.

Note: Perform the following adjustment after reinstalling the take-up guide roller base.
• 4.4 Supply/Take-up Guide Roller Height Adjustment

D. Loading Relay Gear (1) (Fig. 4-7)

Components to remove in advance	Fig No.
• Guide Roller Rail	4-7

- 1) Remove one (1) washer.

Note: Perform the following adjustment after reinstalling loading relay gear (1).
• 3. PHASE MATCHING IN ASSEMBLY in CHAPTER 3.

E. Loading Relay Gear (2) (Fig. 4-7)

Components to remove in advance	Fig No.
• Guide Roller Rail	4-7

- 1) Remove loading relay gear (2) from the chassis.

Note: Perform the following adjustment after reinstalling loading relay gear (2).
• 3. PHASE MATCHING IN ASSEMBLY in CHAPTER 3.

F. Loading Ring (Fig. 4-7)

Components to remove in advance	Fig No.
• Guide Roller Rail	4-7

- 1) Remove one (1) screw.

Note: Perform the following adjustment after reinstalling the loading ring.
• 3. PHASE MATCHING IN ASSEMBLY in CHAPTER 3.

G. Loading Relay Gear (3) (Fig. 4-7)

Components to remove in advance	Fig No.
• Guide Roller Rail	4-7

- 1) Remove loading relay gear (3) from the chassis.

Note: Perform the following adjustment after reinstalling loading relay gear (3).
• 3. PHASE MATCHING IN ASSEMBLY in CHAPTER 3.

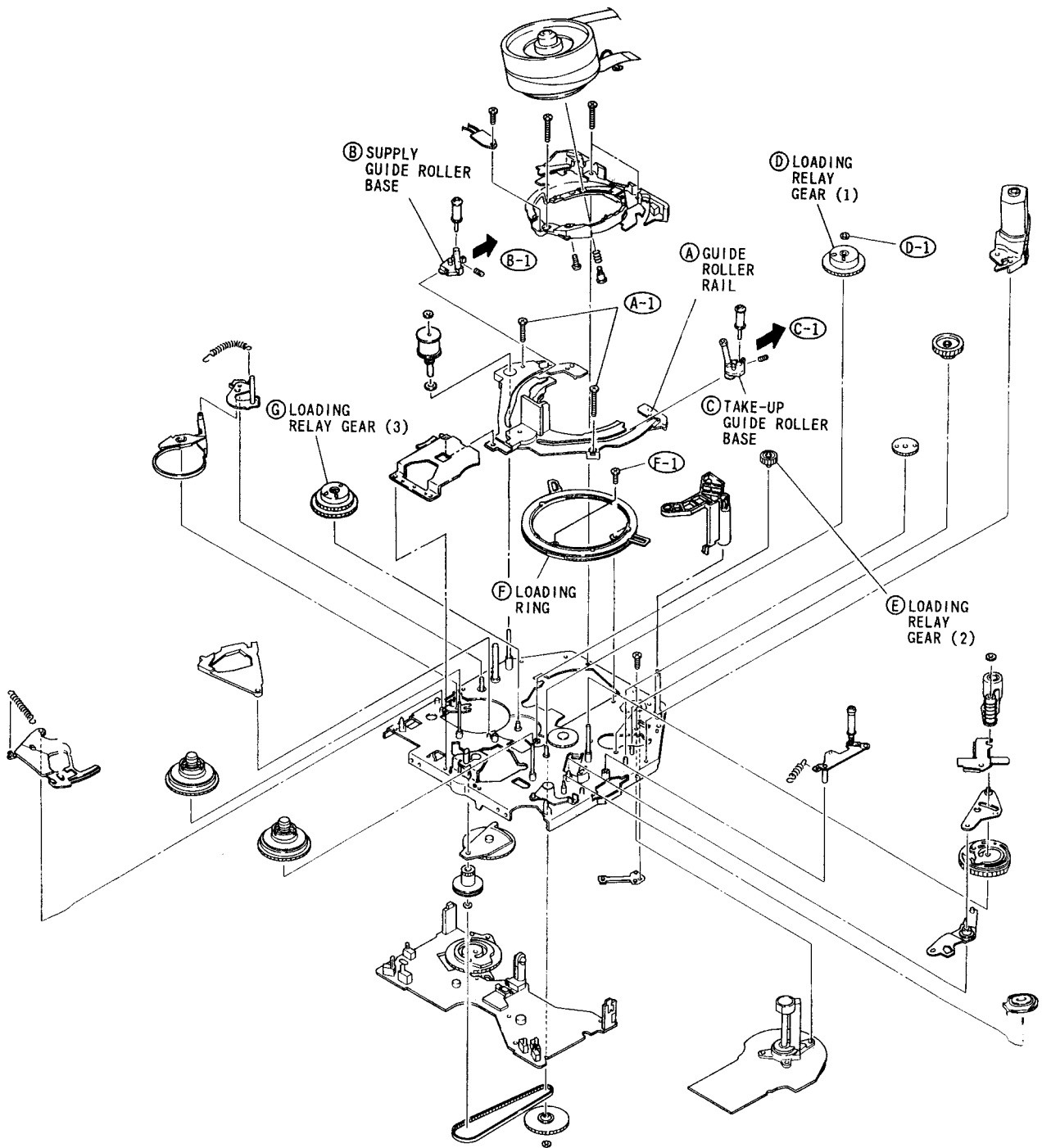
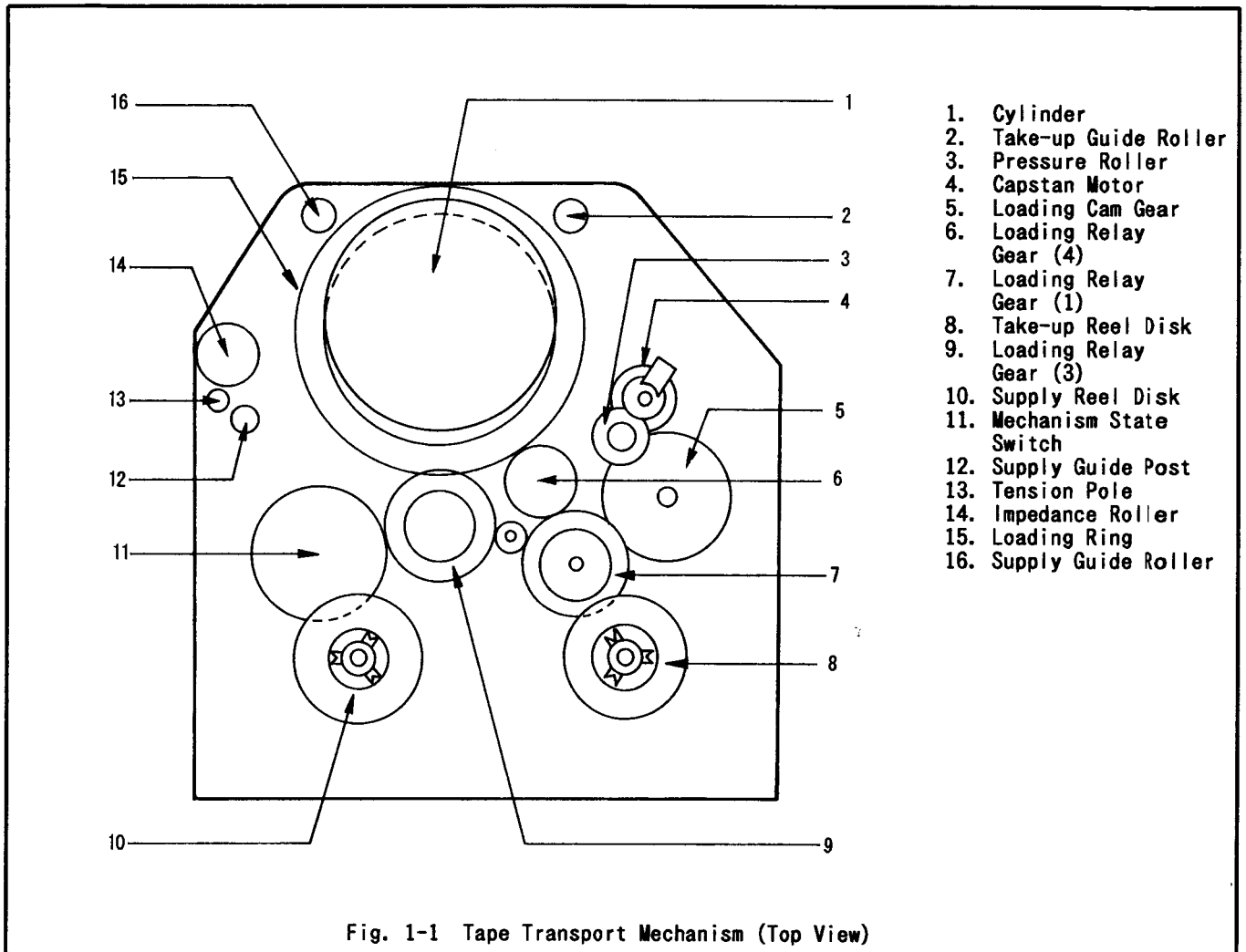


Fig. 4-7

MECHANISM ADJUSTMENT

1. MAJOR MECHANICAL COMPONENTS



2. BEFORE STARTING ADJUSTMENT

- Be sure to set the camera/recorder to the unloading/stop mode when dismantling the tape transport block.
- Do not re-use washers once they have been removed.
- Remove the components shown below beforehand, referring to CAPTER 2 DISASSEMBLY.
- With this camera/recorder, mechanical adjustments (tape transport system check/adjustment) can be done with the unassembled VTR block (without connecting the camera block).
- To set the camera/recorder to the playback mode without loading a cassette, shut off the light striking the end LEDs in the chassis and press the playback button. (Shut off the light striking the end LEDs in the eject state.)

Components to remove in advance	Fig. No.
• Lens Hood Holder	3-2
• Top Cover	3-2
• Open the Right Case	3-2
• Main Block	3-4
• Main Circuit Board	3-5
• VTR Frame and Tape Transport Mechanism	3-5

3. PHASE MATCHING IN ASSEMBLY

Caution 1: Here, the phases of all components are aligned in the unloading/stop mode. Be sure to set the camera/recorder to the unloading/stop mode before dismantling the tape transport block.

Caution 2: Be sure to check and adjust when reinstalling the mechanism state switch, loading motor, gears and loading ring.

3.1 Mechanism State Switch [Mecha. State Sw] (Fig. 3-1)

● Procedure of phase matching in assembly

- 1) Align mark (A) and mark (a) on the mecha. state sw and mecha. state sw case.

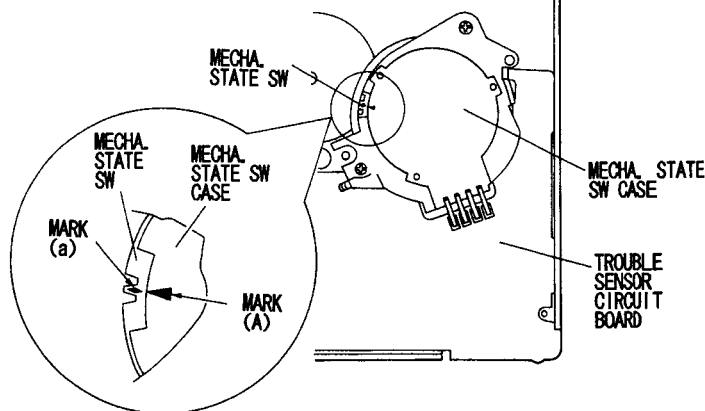


Fig. 3-1

3.2 Loading Gears and Loading Ring (Figs. 3-2, 3-3)

Caution: Be careful that the phase of the mechanism state switch which was matched in item 3-1 does not drift.

● Procedure of phase matching in assembly

- 1) Align the markings of the loading ring and gears as shown in Fig. 3-2.

Caution: When reinstalling the pressure roller cam gear, set the eject lock arm to the position shown in Fig. 3-3 and check that pin (K) is inserted in groove (k) in the back of the pressure roller cam gear.

Advice: If it is difficult to see marking (E) on the lower loading ring, match the phase by the following procedure.

- ① Set the upper and lower loading rings to the state shown in Fig. 3-2. (Watch the guide roller fixing section.)
- ② Move the upper and lower loading rings so that holes (I) overlap each other.
- ③ If holes (I) overlap each other, the phase of the loading ring is correct.

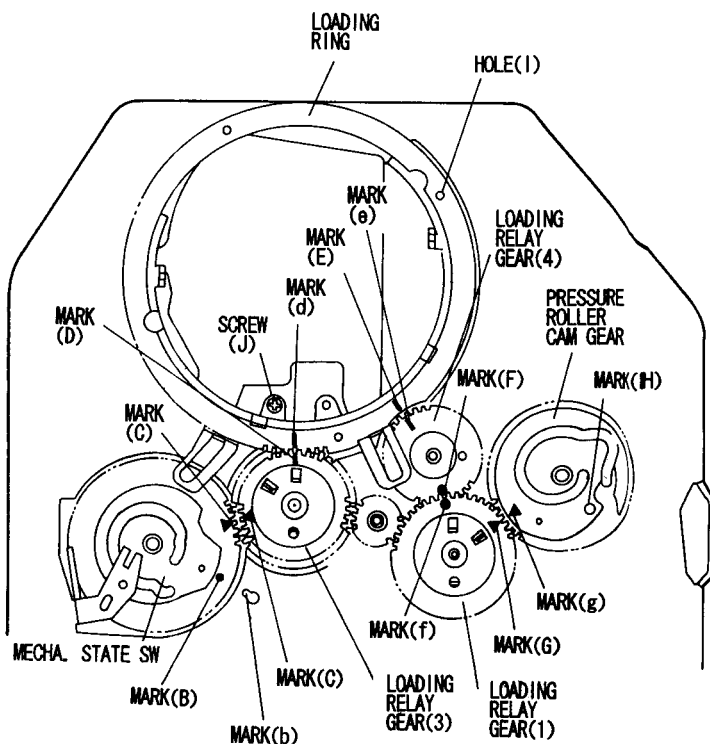


Fig. 3-2

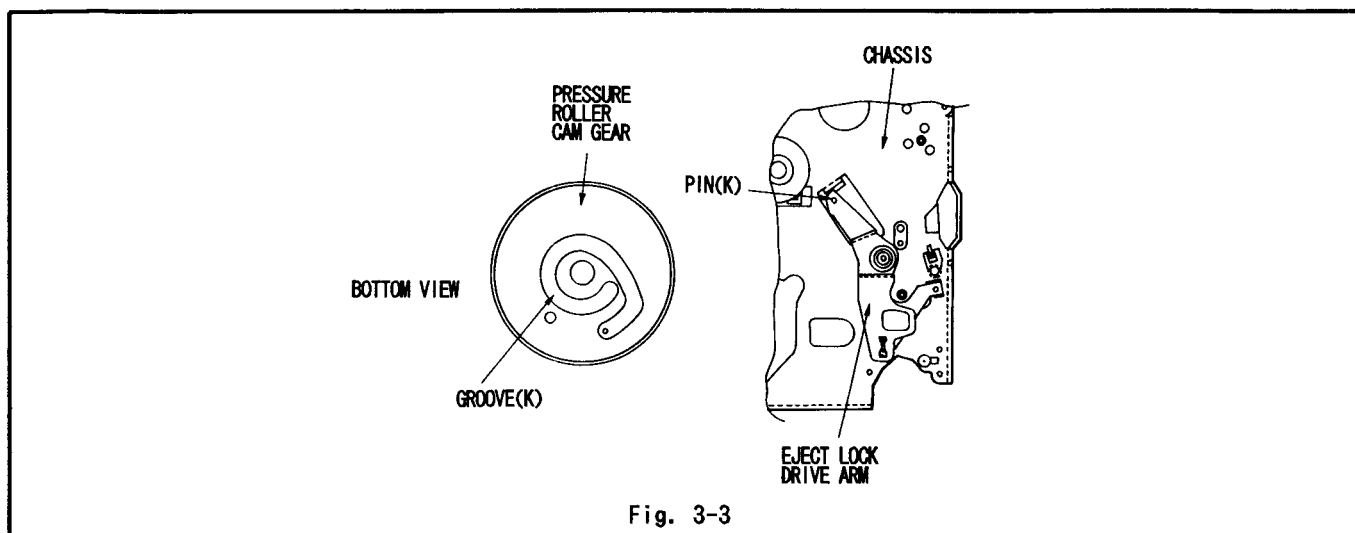


Fig. 3-3

4. TAPE TRANSPORT SYSTEM CHECK/ADJUSTMENT

The tape transport system is a generic term for the path from the supply reel disk to the take-up reel disk via the cylinder. The tape transport components, especially the components which come into direct contact with the tape, should be kept clean without damage, dust or oil, etc. adhering to the contact surfaces. The tape transport system is adjusted before shipment from the factory, so perform adjustments only when components of the transport system are replaced or adjustments of the transport system have drifted.

4.1 Tension Pole Position/Tension Torque Adjustments (Fig. 4-1)

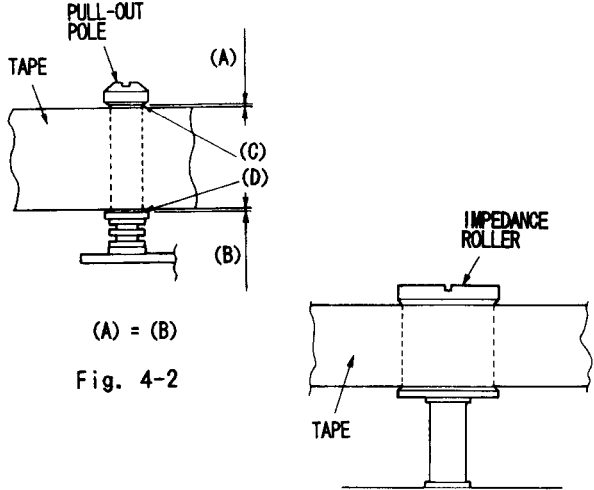
Caution: Be sure to perform these adjustments after reinstalling the tension arm, tension band and tension spring.

Test equipment/jigs	Test equipment/jigs connection points	State of VTR	Adjustment point
		• Shut off the light striking the end LEDs and set to the playback mode without loading a cassette	• Tension band holder
• Cassette torque meter (SRK-8T-212)	• Load a cassette torque meter	• Set to the playback mode.	• Tension spring
● Adjustment procedure ◆ Tension pole position adjustment (Fig. 4-1) 1) Hook the tension spring to position (B) of the spring holder. 2) Loosen screw (D) holding tension band holder (E). 3) Adjust the position of tension band holder (E) so the relationship between the hole in the tension arm and guide roller rail is as shown in Fig. 4-1. 4) Tighten screw (D). 5) Perform playback and stop several times and check that the specification in step 3) is satisfied. If it is not satisfied, re-adjust the tension pole position. ◆ Tension torque adjustment (Fig. 4-1) 1) Hook the tension spring to position (B) of the spring holder. 2) Set the tension torque on the supply side to 4.5 - 6.0 g-cm. If it is more than 6.1 g-cm: Move the tension spring to position (A) of the spring holder. If it is less than 4.4 g-cm: Move the tension spring to position (C) of the spring holder.			

Fig. 4-1

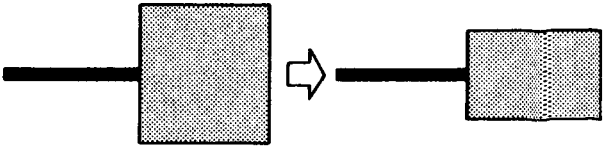
4.2 Pull-out Pole and Impedance Roller Height Check/Adjustment (Figs. 4-2, 4-3)

Caution: Be sure to check this item after reinstalling the pull-out arm and impedance roller.
Basically, the pull-out pole height should not be adjusted.
Adjust the pull-out height only if it is abnormal.

Test equipment/jigs	Test equipment/jigs connection points	State of VTR	Adjustment point
- Blank tape (P5-90) - Special driver		Load a blank tape and set to the playback mode.	Top of pull-out pole
● Checking/adjustment procedure ◆ Pull-out Pole 1) Check that the tape is running at the centre of the pull-out arm. If it is not, adjust the height of the arm. 2) Set to the reverse search mode. 3) Check that the tape is running between (C) and (D) and also no curling or creasing occurs. 4) If step 3) cannot be confirmed, fine adjust the height of the pull-out arm. ◆ Impedance Roller 1) Check that there is no curling or creasing of the tape occurs around the impedance roller. If curling or creasing occurs, check the installation of the impedance roller.		 (A) = (B) Fig. 4-2 Fig. 4-3	

4.3 Supply/Take-up Guide Roller Height Adjustment (Figs. 4-4, 4-5)

Caution: Be sure to check this item after reinstalling the supply guide roller and take-up guide roller.
Basically, the height of the supply/take-upguide rollers should not be adjusted.
Adjust these heights only if they are abnormal.

Test equipment/jigs	Test equipment/jigs connection points	State of VTR	Adjustment point
- Alignment tape - Oscilloscope - ATF-R jig - Special driver	- PG601 on Main board - TP1 (SW25) on ATF-R jig - TP2 (GND) on ATF-R jig - TP3 (FM OUT) on ATF-R jig	- Connect the ATF-R jig to PG601. - ATF-R jig (SW1: OFF, SW3: ON, RT1: mechanical centre)	Top of guide rollers
● Adjustment procedure Caution: Before performing this adjustment, refer to Fig. 7-1 and modify the ATF-R jig. Connect the ATF-R jig before supplying power. 1) Load an alignment tape that has been completely rewound. Press PLAY button and hold it, then set the POWER switch to VIDEO position. 2) Connect an oscilloscope to TP3 on the ATF-R jig. 3) Synchronize the oscilloscope with TP1 (SW25) on the ATF-R jig. 4) Set the oscilloscope to (+) slope. ◆ Supply Guide Roller 5) Press SW2 on the ATF-R jig and hold it, then perform the following steps. 6) Adjust the height of the supply guide roller so the waveform is flat. 7) Set SW1 on the ATF-R jig to ON. 8) Turn RT1 on the ATF-R jig and check that the waveform always changes while being flat. 9) If step 8) cannot be confirmed, adjust the height of the guide roller precisely so the specifications in step 8) are satisfied.		 Fig. 4-4	

◆Take-up Guide Roller

- 10) Set the oscilloscope to (-) slope.
- 11) Turn RT1 on the ATF-R jig so the waveform is shaped as shown in Fig. 4-5.
- 12) Adjust the voltage level control of the oscilloscope so that portion (A) of the waveform is set to 3 graduations.
- 13) Adjust the height of the take-up guide roller so the minimum amplitude of the waveform is set to 2.7 ± 0.3 graduations.

Caution: After adjustment is completed, be sure to reverse the modification to ATF-R jig.

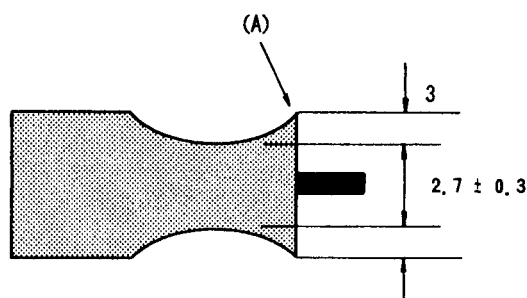


Fig. 4-5

5. ADJUSTMENT AFTER REPLACING THE CYLINDER (Figs. 5-1, 5-2)

When the cylinder is replaced, the height relative to the guide roller drifts, therefore the tape transport system and servo circuit should be adjusted. Check and adjust in the following order.

Test equipment/jigs	Test equipment/jigs connection points	State of VTR	Adjustment point
- Alignment tape - Oscilloscope - ATF-R jig - Special driver	- PG601 on Main board - TP1 (SW25) on ATF-R jig - TP2 (GND) on ATF-R jig - TP3 (FM OUT) on ATF-R jig	- Connect the ATF-R jig to PG601. - ATF-R jig (SW1: OFF, SW3: ON, RT1: mechanical centre)	Top of guide rollers

●Adjustment procedure

Caution: Before performing this adjustment, refer to Fig. 7-1 and modify the ATF-R jig. Connect the ATF-R jig before supplying power.

- 1) Load an alignment tape that has been completely rewound. Press PLAY button and hold it, then set the POWER switch to VIDEO position.
- 2) Connect an oscilloscope to TP3 on the ATF-R jig.
- 3) Synchronize the oscilloscope with TP1 (SW25) on the ATF-R jig.
- 4) Set the oscilloscope to (+) slope.
- 5) Press SW2 on the ATF-R jig and hold it, then perform the following steps.
- 6) Set SW1 on the ATF-R jig to ON.
- 7) Turn RT1 on the ATF-R jig and check that the waveform always changes while being flat. (See Fig. 5-1) If this cannot be confirmed, adjust the height of the supply guide roller, referring to "4.4 Supply/Take-up Guide Roller Height Adjustment".
- 8) Set the oscilloscope (-) slope.
- 9) Turn RT1 on the ATF-R jig so the waveform is shaped as shown in Fig. 5-2.
- 10) Adjust the voltage level control of the oscilloscope so that position (A) of the waveform is set to 3 graduations.
- 11) Check that the minimum amplitude of the waveform is set to 2.7 ± 0.3 graduations. If this cannot be confirmed, adjust the height of the take-up guide roller, referring to "4.4 Supply/Take-up Guide Roller Height Adjustment".
- 12) Perform the following electrical adjustments, referring to CHAPTER 4.
 - Head switching point adjustment
 - Record luminance/chroma level adjustment

Caution: After adjustment is completed, be sure to reverse the modification to ATF-R jig.

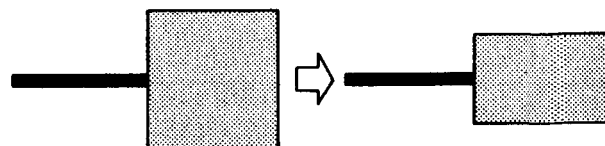


Fig. 5-1

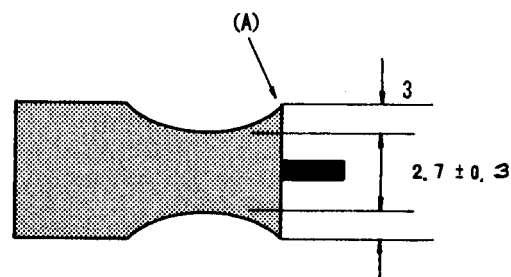


Fig. 5-2

6. CHECKING THE TORQUE

There are two types of cassette torque meter.

Choose the applicable one for the measurement to be performed.

Item	VTR mode	Measured reel disk	Torque value	Torque cassette used
Take-up torque	Playback	Take-up	7-13 g-cm	SRK-8T-212 SRK-8T-232
Rewind torque	Reverse search	Supply	25-37 g-cm	SRK-8T-232
Take-up brake torque	Reverse search to stop	Take-up	10 g-cm or more	SRK-8T-212 SRK-8T-232
Slack removal torque	Unloading	Supply	25-37 g-cm	SRK-8T-232

7. MODIFICATION TO ATF-R JIG (Fig. 7-1)

Caution: The ATF-R jig must be modified for the following adjustments.

After completing these, be sure to reverse the modification.

- 4.4 Supply/Take-up Guide Roller Height Adjustment
- 5. ADJUSTMENT AFTER REPLACING THE CYLINDER

● Procedure

- 1) Short terminal (A) of the resistor and TP2 (GND) on the ATF-R jig.

Note: This modification makes SW2 on the ATF-R jig a PCM area observation switch.

Caution: Use a shorting clip, etc. to short the parts; this can be removed easily after adjustment is completed.
A modification is also necessary in the same way when the ATF jig is used.

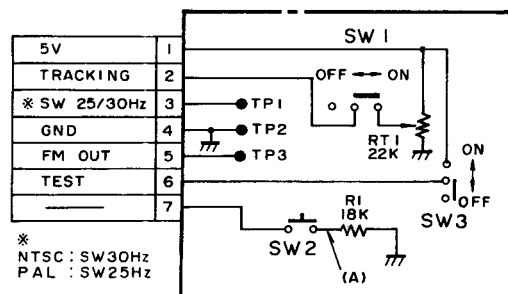
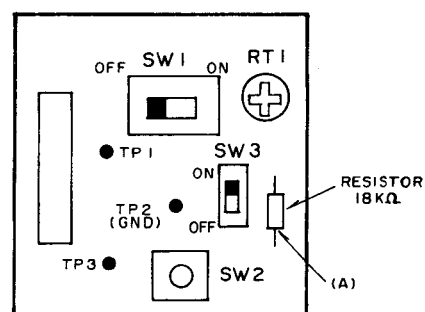


Fig. 7-1

MECHANICAL BLOCK MAINTENANCE/INSPECTION PROCEDURE

1. Required Maintenance/Inspection

The mechanical block (tape transport system) in an 8mm video camera/recorder uses very precise components. If any of these components is worn or dirty, the symptoms will be the same as if the component is defective.

To ensure a good picture, the tape transport system must be cleaned and lubricated periodically, and worn-out components must be replaced.

2. Scheduled Maintenance/Inspection

Schedules for maintenance and inspection are not fixed because they vary according to the way in which and what for the customer uses the camera/recorder and the environment in which it is used. But, in general home use, a good picture will be maintained if inspection and maintenance are done every 500 hours.

Refer to Table 4 for the components which must be maintained and inspected and the details of the maintenance/inspection schedules.

Lubricate oil when replacing components.

Table 1 Average hours used per day and maintenance/inspection schedules

Average hours per day	About 6 months ↓	About 9 months ↓	About 18 months ↓
One hour			
Two hours			
Three hours			

3. Check before Judging that Unit is Faulty

If the faults in Table 2 occur during playback, they may be remedied when the tape transport system is cleaned and lubricated. Check the conditions of cleanliness of the unit and the need for lubrication.

If from that you determine that the unit is ready for inspection and maintenance, check the components shown in Table 2.

Table 2 Defective Phenomena and Inspection Locations

Defective phenomenon during play	Inspection location
Poor picture S/N, no color	Dirt on vide head or worn video head
Tape does not run or tape is slack	Dirt on pressure roller, in tape transport system or/and on cylinder
Low volume or sound distorted	Dirt on video head or worn video head

4. Tools Needed for Inspection and Maintenance

- (1) Head cleaning kit
- (2) VTR oil kit
- (3) Ethyl alcohol (ethanol)
- (4) Gauze
- (5) Cleaning tape Maxell 8M-CL MCA (dry type)

Table 3 Locations for Greasing and Lubricating using the Oil Kit

Name	Using locations
Sonic Slidas oil (#1600)	Lubricate low-speed rotating sections
Froil (G31-SAY)	Grease metal or molded sections subject to light load
Lock paint	Fix adjustment screws and nuts
Pan motor oil	Not used
Hitazol	Not used

The above VTR kit and head cleaning kit are those used conventionally (for VHS and VHS-C recorders). Always use these kits for maintenance.

5. Maintenance Procedures

5-1. Cleaning

(1) Cleaning video heads

First use a specified cleaning tape. Before using it, read its instruction sheet carefully. If the dirt on the video heads is too stubborn to be removed by tape, use the head cleaning kit by the following procedure. (See Fig. 1)

- ① Moisten the chamois leather on the cleaning stick with cleaning fluid.
- ② Touch the chamois leather on the cleaning stick against the head tip and gently turn the upper cylinder to the left and right.

Caution: Do not move the cleaning stick vertically or/and make sure that only the chamois leather on the cleaning stick comes into contact with the head tip. Otherwise, the head tip could be damaged.

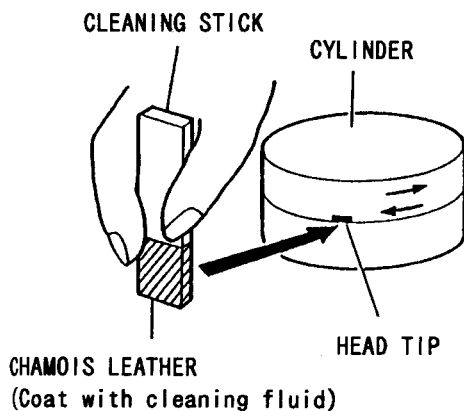


Fig. 1 Vide Head Cleaning Procedure

(2) Cleaning the tape transport system

Moisten gauze with ethyl alcohol and use it to wipe the surfaces of components which come into contact with the tape.

Caution: Be careful that the tape transport components are not damaged nor deformed by cleaning.

5-2. Lubricating Sonic Slidas Oil (#1600)

(1) Periodic lubrication

Lubricate the specified locations only when replacing components.

Normally, it is not necessary to lubricate in a period other than components are replaced.

(2) Procedure

Use the oiler to apply one or two drop of Sonic Slidas oil to the specified sections. Refer to the exploded views for the lubricating locations.

Caution: Do not use too much oil because it may spill over or leak, coming into contact with rotating parts and causing slippage or other defects.
If too much oil is applied, wipe clean using gauze moistened with ethyl alcohol.

5-3. Greasing the Froil (G31-SAY)

(1) Periodic greasing

Grease the specified locations only when replacing components.

Normally, it is not necessary to grease in a period other than components are replaced.

(2) Procedure

Apply Froil with a stick or brush to the specified locations. Refer to the exploded views for the greasing locations.

Caution: Do not use excess Froil. It may come into contact with the tape transport components and may cause defects.
Wipe off any excess using gauze moistened with ethyl alcohol.

Table 4 Parts to be Maintained/Inspected and Maintenance/Inspection Schedules

Caution: The following table dose not apply to all units. The maintenance/inspection schedules depend no how the unit is used and environment in which it is used.

Hours Components	500	1000	1500	2000	2500	3000
Video heads (Cylinder)	Clean	Clean/ Replace	Clean	Clean/ Replace	Clean	Clean/ Replace
Supply guide roller	Clean	Clean	Clean	Clean	Clean	Clean
Take-up guide roller	Clean	Clean	Clean	Clean	Clean	Clean
Supply guide pole	Clean	Clean	Clean	Clean	Clean	Clean
Impedance roller	Clean	Clean	Clean	Clean	Clean	Clean
Tension pole	Clean	Clean	Clean	Clean	Clean	Clean
Pull-out pole	Clean	Clean	Clean	Clean	Clean	Clean
Pressure roller	Clean	Clean	Clean	Clean/ Replace	Clean	Clean
Supply reel disk	_____	_____	_____	Replace	_____	_____
Take-up reel disk	_____	_____	_____	Replace	_____	_____
Tension band	_____	Replace	_____	Replace	_____	Replace
Capstan belt	_____	_____	_____	Replace	_____	_____
Reel drive idler	_____	_____	_____	Replace	_____	_____
Capstan motor shaft (Capstan motor)	Clean	Clean	Clean	Clean/ Replace	Clean	Clean
Loading motor	_____	_____	_____	Replace	_____	_____

ELECTRICAL ADJUSTMENT

Note 1: The digital adjustment programme for the camera is called the MAP (Manual Adjustment Programme).

Note 2: DSP is an abbreviation for the digital signal processor.

1. CONNECTION FOR ADJUSTMENT

Remove the components, etc. listed below first, referring to CHAPTER 2 DISASSEMBLY. (See Fig. 1-1)

Note 1: It is not necessary to remove cases for digital, autofocus and system control/servo circuits adjustments.

ORDER FOR REMOVING PARTS Fig No. 3-1, 3-2
 • Cassette lid, Lens Hood Holder, Top Cover, and Right Case

Note 2: To perform the electronic volume adjustment, remove the following components and then use an extension cable to connect the camera/recorder and test equipment so the camera and main blocks can be adjusted.

ORDER FOR REMOVING PARTS Fig No. 3-4
 • Main Block, Camera Block, MIC and Left Case

Note 3: If it is necessary to display operation modes, connect the EVF.

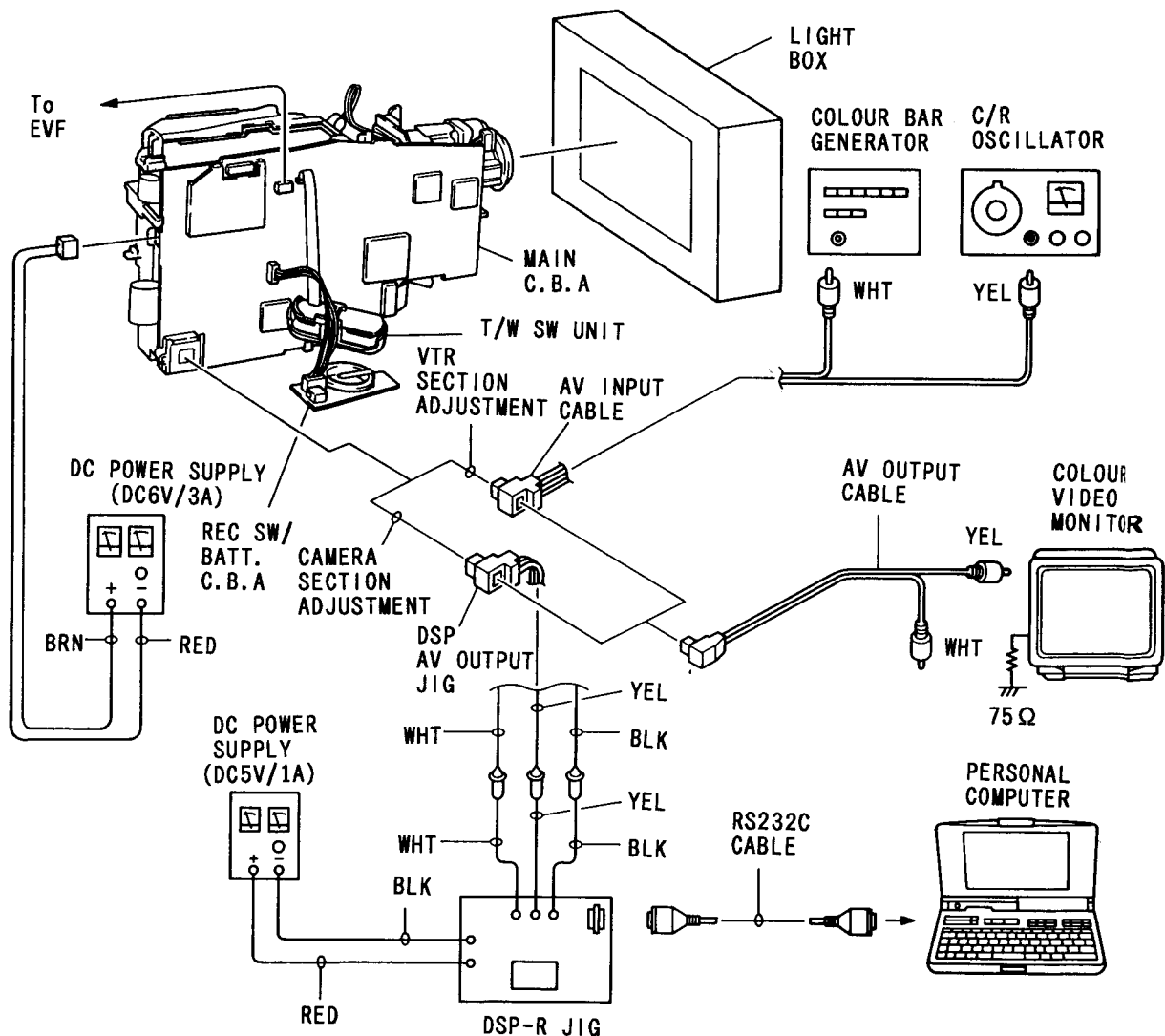


Fig. 1-1

2. CAMERA SECTION ADJUSTMENT

2.1 CIRCUIT BOARD LOCATIONS

1. Main Circuit Board
2. Sensor Circuit Board
3. T/W SW Unit
4. REC SW/Batt. Circuit Board

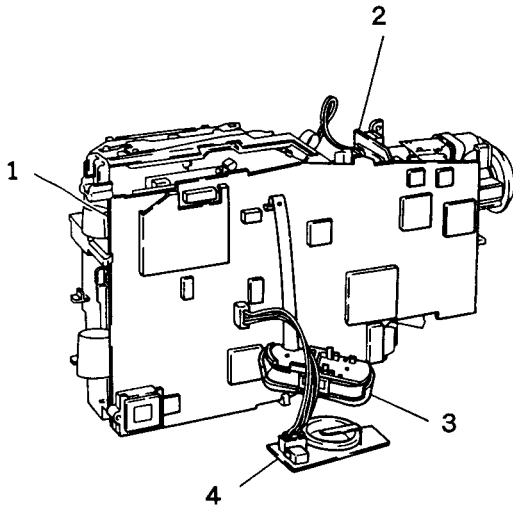


Fig. 2-1

2.2 TEST EQUIPMENT AND CHARTS NECESSARY FOR ADJUSTMENT

- Test Equipment
 - Oscilloscope (dual trace)
 - [Vectorscope]
 - Digital Voltmeter (DVM)
 - Frequency Counter
 - Colour Video Monitor
- Charts, etc.
 - Adjustment Floppy Disk
 - Personal Computer
 - Personal Computer 9-pin or 25-pin (RS232C) Cable
 - DSP-R Jig
 - DSP AV Output Cable
 - Gray Scale Chart
 - Colour Bar Chart
 - Resolution Chart
 - Backfocus Adjustment Chart
 - Light Box (3100° K)
 - Light Balancing Filter C12
 - DC Power Supply (DC6V/3A)
 - DC Power Supply (DC5V/1A)

2.3 ADJUSTMENT CONDITION

- 1) Check that the VTR section has been adjusted correctly before adjusting the camera section.
- 2) Use a light box with minimum flickering. Control the colour temperature of the light box strictly.
- 3) Connect this unit, a power supply and a colour video monitor as shown in Fig. 1-1.
- 4) When using the video out (AV OUT) to perform adjustment, be sure to terminate the AV OUT jack with 75 ohms.
- 5) Place the chart (light box) approx. 30cm away from the camera (lens surface) when otherwise not specified.
- 6) Point the camera at the chart to full the video period when otherwise not specified.
- 7) Use the 10:1 probe of the oscilloscope when otherwise not specified.
- 8) When "Trigger the oscilloscope internally" is specified, set the time base of the oscilloscope to 10μs/div.

2.4 PRESET POSITIONS OF SWITCHES AND CONTROLS DURING ADJUSTMENT

- CAMERA/OFF/VIDEO switch "CAMERA" position
- INST. ZOOM Not Display mode
- DATE Not Display mode
- DISPLAY Not Display mode
- TITLE Not Display mode

2.5 LIST OF CHARTS FOR CAMERA ADJUSTMENT

Table 2-1

GREY SCALE CHART 	COLOUR BAR CHART 	RESOLUTION CHART
BACKFOCUS ADJ. CHART 		

2.6 ADJUSTMENTS AFTER REPLACING MAJOR COMPONENTS IN THE CAMERA SECTION

After replacing major components, perform adjustments, referring to the table below.

The following table shows the minimum adjustments required after major components are replaced.

The table below may not apply when several components are replaced, depending on the symptom of the defect.

Caution : When EEPROM or the main circuit board is replaced, initialize the EEPROM, referring to "2.7.3 Initial Setting by Model", then perform all the camera section and system control/servo circuits adjustments.

ITEM No.	NAME OF ADJUSTMENT	NAME OF MAJOR COMPONENTS							
		SENSOR C.B.A	MAIN C.B.A	IC1001	IC1101	IC1105	IC1106	IC1109	IC1110
—	Initial Setting by Model		●				●		
ELECTRIC VOLUME ADJUSTMENT PROCEDURE									
(1)	Sensor Drive Voltage Adjustment	●	●	●			●		●
(2)	CDS Offset Adjustment		●		●		●		
(3)	Sensor Drive Pulse & Sub Voltage Adjustment	●	●	●			●		●
(4)	VCO Lock Voltage Adjustment		●				●		
DIGITAL ADJUSTMENT PROCEDURE									
(1)	Auto Iris Control Adjustment	●	●	●	●	●	●	●	
(2)	Knee Adjustment		●		●		●		
(3)	Matrix Adjustment	●	●	●	●		●		
(4)	White balance Adjustment	●	●	●	●		●		
(5)	Chroma gain Adjustment	●	●	●	●		●		
AUTO FOCUS ADJUSTMENT PROCEDURE									
(1)	Zoom Trace Adjustment		●				●		
(2)	AF Noise Level Adjustment		●				●		

2.7 CAMERA SECTION ADJUSTMENT PROCEDURE

Note 1: The digital adjustment programme for camera is called the MAP (Manual Adjustment Programme).

Note 2: To complete adjustment, press the **ESC** (escape) key twice to restore the MS-DOS screen and then turn off the camera recorder and jigs.

2.7.1 Connections for Adjustment

Connect the camera/recorder, DSP jig, personal computer, power supply, etc. as shown in Fig. 1-1.

Note 1: Check that the camera/recorder is turned on.

2.7.2 How to Start the Adjustment Programme (MAP)

Note 1: The following describes an example of the instructions of the personal computer and the menu display; they are different depending on the personal computer manufacturer and model. Refer to the instruction manual of personal computer.

F>

Fig. 2-2



LOAD THE CAMERA ADJ. FLOPPY DISK INTO DISK DRIVE B



Press **B** **:** **ENTER**



F>B:
B>

Fig. 2-3



Press **M** **A** **P** **□** **I** **B** **M** **(SPACE)** **1**
ENTER



F>B:
B>MAP_IBM 1

Fig. 2-4



- 1) Turn the personal computer on and start the MS-DOS system. (Fig. 2-2)

Note 2: Refer to the instruction manual of the personal computer for how to start the computer.

- 2) Load the adjustment floppy disk into disk drive B and press **[B]** then **ENTER**.
(B may be small letter.) (Fig. 2-3)

Note 3: If the adjustment floppy disk is loaded into disk drive A, press **[A]** then **ENTER**.

- 3) Press **[M]** **[A]** **[P]** **[]** **[I]** **[B]** **[M]** **[SPACE]** **[1]** then **ENTER** (MAP and IBM may be small letters).
The digital adjustment programme (MAP: Manual Adjustment Programme) starts and the MODEL SELECT shown Fig. 2-6 appears.

Note 4: When you use a personal computer with two serial interface connectors and connect the DSP jig to serial interface connector 2, press MAP_IBM 2.

- 4) Select the number according to the model.
If **[ESC]** (escape) is pressed, the display before the MAP starts (MS-DOS) is restored.

Note 5: If you specify the wrong model, press **[ESC]** (escape) to restore the MODEL SELECT display, then specify the correct model.

Note 6: If you select number without a model name by mistake, the message shown in Fig. 2-8 will appear in the computer's display. Press any key to return the display to Fig. 2-6 (MODEL SELECT).

Note 7: If there are more than 5 models and **[P]** is pressed, the computer's display changes to the next page.

Refer to "2.7.3 Initial Setting by Model" for DATA INITIALIZE.

Refer to "2.7.4 Electric Volume Adjustment Procedure" for ELECTRIC VOLUME.

Refer to "2.7.5 Digital Adjustment Procedure" for ADJUSTMENT.

Refer to "2.7.6 Autofocus Adjustment Procedure" for AUTO FOCUS.

Refer to "3. VTR SECTION ADJUSTMENT" for VTR ADJUSTMENT.

Manual adjustment program for service station

Fig. 2-5

MODEL SELECT

```
*****
***** MODEL SELECT *****
*****

[1]  XXXXXXXX
[2]  XXXXXXXX
[3]  XXXXXXXX
[4]  XXXXXXXX
[5]  XXXXXXXX
[P]  NEXT SELECTION
[ESC] END

Please select the type of the set.
Hit [1] - [5] or [P] or [ESC]
```

Fig. 2-6

Press numeric key

MAIN MENU

```
*****
***** MANUAL ADJUSTMENT PROGRAM *****
*****

[A]  DATA INITIALIZE
[B]  ELECTRIC VOLUME
[C]  ADJUSTMENT
[D]  AUTO FOCUS
[E]  VCR ADJUSTMET
[ESC] END

Please select [A], [B], [C], [D], [E] or [ESC]
```

Fig. 2-7

MESSAGE WHEN OPERATED BY MISTAKE

Can not find the DATA FILE
**** HIT ANY KEY ****

Fig. 2-8

2.7.3 Initial Setting by Model

Note 1: This item describes how to initialize the EEP ROM. Be sure to perform this item after replacing EEP ROM or the main circuit board. When other components are replaced, normally, it is not necessary to initialize the EEP ROM. Press **[ESC]** (escape) to return the computer's display to MAIN MENU.

1) Start the MAP, referring to "2.7.2 How to Start the Adjustment Programme (MAP)".

2) Press **[A]** to select INITIALIZE. (Figs. 2-9, 2-10)

3) Press **[Y]** to start. (Figs. 2-10, 2-11)

Note 2: Press **[N]** to return to MAIN MENU. (Fig. 2-10)

4) If there are no abnormalities in the camera/recorder, the message shown in Fig. 2-11 is displayed in the computer's display for a while, and then the message informing you that the initial setting has been completed (shown in Fig. 2-12) is displayed.

5) If the message shown in Fig. 2-12 appears in the computer's display, press any key. The computer's display returns to Fig. 2-9 (MAIN MENU).

6) Be sure to perform the following adjustments after completing the initial setting.

- 2.7.4 Electric Volume Adjustment Procedure
- 2.7.5 Digital Adjustment Procedure
- 2.7.6 Autofocus Adjustment Procedure
- 3.7 System Control/Servo Circuits Adjustment

Note 3: If an error message appears in the computer's display, refer to "4. Error Messages". If a key is pressed after the error message appears, the computer's display returns to the MAIN MENU (Fig. 2-9)

MAIN MENU

```
*****
***** MANUAL ADJUSTMENT PROGRAM *****
*****
[A] DATA INITIALIZE
[B] ELECTRIC VOLUME
[C] ADJUSTMENT
[D] AUTO FOCUS
[E] VCR ADJUSTMET
[ESC] END
Please select [A], [B], [C], [D], [E] or [ESC]
```

Fig. 2-9



Press **[A]**



```
<< DATA WRITING >>
START TO SEND DATA. (Y/N)
```

Fig. 2-10



Press **[Y]**



```
PLEASE WAIT A MOMENT
```

Fig. 2-11



```
FINISHED WRITING DATA !!
PRESS ANY KEY !
```

Fig. 2-12



Press any key to return to Fig. 2-9

2.7.4 Electric Volume Adjustment Procedure

Note 1: When EEPROM or the main circuit board is replaced, initialize the EEPROM, referring to "2.7.3. Initial Setting By Model" then perform all the electric volume adjustments.

- 1) Start the MAP, referring to "2.7.2 How to Start the Adjustment Programme (MAP)".
- 2) Press **[B]** to select ELECTRIC VOLUME. (Figs. 2-13, 2-14)
- 3) Select the number of the required adjustment.

Note 2: If **[ESC]** (escape) is pressed, the computer's display returns to Fig. 2-13 (MAIN MENU).

Note 3: To complete adjustment, press the **[ESC]** (escape) key twice to restore the MS-DOS screen and then turn off the camera/recorder and jig.

Note 4: When an error message appears during adjustment, refer to "4. Error Messages".

MAIN MENU

```

*****
***** MANUAL ADJUSTMENT PROGRAM *****
*****
[A] DATA INITIALIZE
[B] ELECTRIC VOLUME
[C] ADJUSTMENT
[D] AUTO FOCUS
[E] VCR ADJUSTMET
[ESC] END
Please select [A], [B], [C], [D], [E] or [ESC]
  
```

Fig. 2-13



Press **[B]**



ELECTRIC VOLUME ADJ. MENU

```

*****
***** ELECTRIC VOLUME *****
*****
[1] SENSOR DRIVE VOLTAGE
[2] CDS OFFSET
[3] SENSOR DRIVE PULSE & SUB VOLTAGE
[4] VCO LOCK VOLTAGE
[ESC] RETURN TO MAIN MENU
Please select [1], [2], [3], [4] or [ESC]
  
```

Fig. 2-14

ADJUSTMENT PARTS LOCATION

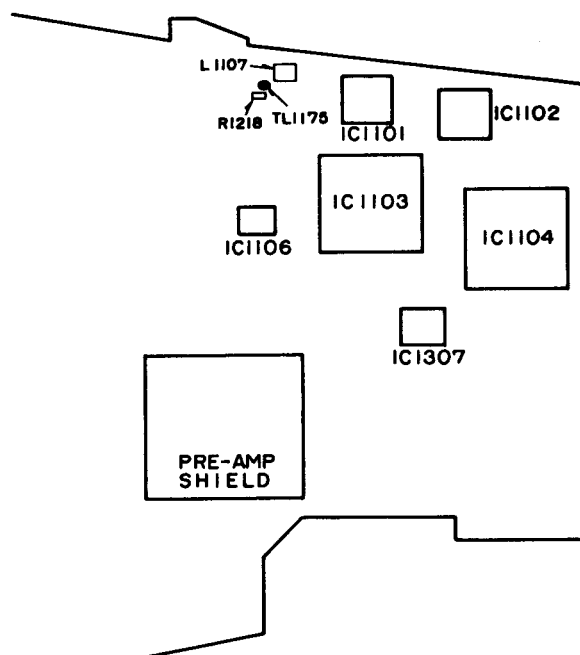


Fig. 2-15 Main Circuit Board (B Side)

(1) Sensor Drive Voltage Adjustment (Fig. 2-15)

PURPOSE	•To measure the supply voltage of the CCD sensor.
INCOMPLETED PHENOMENON	•The CCD sensor output level drops and the picture is distorted.
TEST POINT	•TL1175 MAIN •JK200-9 (GND : Black lead of DSP Output jig)
EQUIPMENT/JIG	•DVM
CONDITION	

PROCEDURE

ELECTRIC VOLUME ADJ. MENU

***** ***** ELECTRIC VOLUME ***** *****	
[1]	SENSOR DRIVE VOLTAGE
[2]	CDS OFFSET
[3]	SENSOR DRIVE PULSE & SUB VOLTAGE
[4]	VCO LOCK VOLTAGE
[ESC]	RETURN TO MAIN MENU
Please select [1], [2], [3], [4] or [ESC]	

Press [1] key to select the sensor drive voltage.

<< ADJUSTMENT OF SENSOR DRIVE VOLRAGE >> SET VOLTAGE OF TL1175 AT 15 (+/- 0.1) V. [U] UP [D] DOWN	
--	--

Press the [U] and [D] keys to set the voltage to 15V ± 0.1V.

Press [ENTER] key, and the display changes as follows.

ADJUSTMANT FINISHED PRESS ANY KEY !	
--	--

Press any key to return to ELECTRIC VOLUME ADJ. MENU.

(2) CDS Offset Adjustment

PURPOSE	•To determine the DC offset levels when the AGC is set to the minimum and maximum gains.
INCOMPLETED PHENOMENON	•When a subject is illuminated brightly in low lighting, a white band appears across the top of the screen.
TEST POINT	
EQUIPMENT/JIG	
CONDITION	

PROCEDURE

ELECTRIC VOLUME ADJ. MENU

***** ***** ELECTRIC VOLUME ***** *****	
[1]	SENSOR DRIVE VOLTAGE
[2]	CDS OFFSET
[3]	SENSOR DRIVE PULSE & SUB VOLTAGE
[4]	VCO LOCK VOLTAGE
[ESC]	RETURN TO MAIN MENU
Please select [1], [2], [3], [4] or [ESC]	

Press [2] key to select the CDS offset.

<< ADJUSTMENT OF CDS OFFSET >> PLEASE WAIT AROUND 50 SEC.	
--	--

<< ADJUSTMENT OF CDS OFFSET >> FINISHED WRITING DATA. ADJUSTMENT FINISHED. PRESS ANY KEY !	
---	--

Press any key to return to ELECTRIC VOLUME ADJ. MENU.

(3) Sensor Drive Pulse and Sub Voltage Adjustment

PURPOSE	•To determine the level of the pulse output from the CCD sensor. To determine the bias voltage of the CCD sensor.
INCOMPLETED PHENOMENON	•No picture. •No colour. •Rough picture. •Smear occurs.
TEST POINT	_____
EQUIPMENT/JIG	_____
CONDITION	•Point the camera at the light box without a chart to full the screen (at wide-angle).

PROCEDURE

ELECTRIC VOLUME ADJ. MENU

```
*****
***** ELECTRIC VOLUME *****
*****
[1]  SENSOR DRIVE VOLTAGE
[2]  CDS OFFSET
[3]  SENSOR DRIVE PULSE & SUB VOLTAGE
[4]  VCO LOCK VOLTAGE
[ESC] RETURN TO MAIN MENU
Please select [1], [2], [3], [4] or [ESC]
```

Press **[3]** key to select the sensor drive pulse & sub voltage.

```
<< ADJUSTMENT OF SUB VOLTAGE &
      SENSOR DRIVE PULSE >>
PLEASE INPUT SENSOR'S SEAL
      NUMBER FROM KEY BOARD==>
```

Check the number in the seal at the back of the CCD image sensor and enter the number into the personal computer.

Press **ENTER** key, and the display changes as follows.

```
<< ADJUSTMENT OF SUB VOLTAGE &
      SENSOR DRIVE PULSE >>
<< NOW ADJUSTING >>
```

```
<< ADJUSTMENT OF SUB VOLTAGE &
      SENSOR DRIVE PULSE >>
ADJUSTMENT FINISHED.
PRESS ANY KEY.
```

Press any key to return to ELECTRIC VOLUME ADJ. MENU.

(4) VCO Lock Voltage Adjustment

PURPOSE	•To synchronize the horizontal sync signal with the subcarrier frequency.
INCOMPLETED PHENOMENON	•The picture is distorted.
TEST POINT	_____
EQUIPMENT/JIG	_____
CONDITION	_____

PROCEDURE

ELECTRIC VOLUME ADJ. MENU

```
*****
***** ELECTRIC VOLUME *****
*****
[1]  SENSOR DRIVE VOLTAGE
[2]  CDS OFFSET
[3]  SENSOR DRIVE PULSE & SUB VOLTAGE
[4]  VCO LOCK VOLTAGE
[ESC] RETURN TO MAIN MENU
Please select [1], [2], [3], [4] or [ESC]
```

Press **[4]** key to select the VCO lock voltage.

```
<< ADJUSTMENT OF VCO LOCK VOLTAGE >>
PLEASE WAIT AROUND 50 SEC.
```

```
<< ADJUSTMENT OF VCO LOCK VOLTAGE >>
FINISHED WRITING DATA.
ADJUSTMENT FINISHED.
PRESS ANY KEY !
```

Press any key to return to ELECTRIC VOLUME ADJ. MENU.

2.7.5 Digital Adjustment Procedure

Note 1: When EEP ROM or the main circuit board is replaced, initialize the EEP ROM, referring to "2.7.3. Initial Setting By Model" then perform all the digital adjustments.

Note 2: When an error message appears during adjustment, refer to "4. Error Messages". If a key is pressed after an error message appears, the ADJUSTMENT MENU is restored.

- 1) Start the MAP, referring to "2.7.2 How to Start the Adjustment Programme (MAP)"
- 2) Press **[C]** to select ADJUSTMENT.
(Figs. 2-16, 2-17)
- 3) Select the number of the required adjustment.

Note 3: If **[ESC]** (escape) is pressed, the computer's display returns to Fig. 2-16 (MAIN MENU).

Note 4: To complete adjustment, press the **[ESC]** (escape) key twice to restore the MS-DOS screen and then turn off the camera/recorder and jig.

Caution: Perform auto iris adjustment [1. AUTO IRIS CONTROL] and knee adjustment [2. KNEE] in the following order.

1. Auto Iris Adjustment (Perform the following autofocus adjustment if "ADJUSTMENT OF HALL CURVE" is not completed).
2. Zoom Trace Adjustment in AUTOFOCUS ADJUSTMENT PROCEDURE.
3. AF Noise Level Adjustment in AUTOFOCUS ADJUSTMENT PROCEDURE.
4. Auto Iris Adjustment (All three items, "ADJUSTMENT OF IRIS OPEN & CLOSE", "ADJUSTMENT OF IRIS" and "ADJUSTMENT OF HALL CURVE" should be complete).
5. Knee Adjustment .

MAIN MENU

```
*****
***** MANUAL ADJUSTMENT PROGRAM *****
*****
[A]  DATA INITIALIZE
[B]  ELECTRIC VOLUME
[C]  ADJUSTMENT
[D]  AUTO FOCUS
[E]  VCR ADJUSTMET
[ESC] END
Please select [A], [B], [C], [D], [E] or [ESC]
```

Fig. 2-16



Press **[C]**



ADJUSTMENT MENU

```
*****
***** ADJUSTMENT *****
*****
[1]  AUTO IRIS CONTROL
[2]  KNEE
[3]  MATRIX
[4]  WHITE BALANCE
[5]  CHROMA GAIN
[ESC] RETURN TO MAIN MENU
Please select [1], [2], [3], [4], [5] or [ESC]
```

Fig. 2-17

(1) Auto Iris Control Adjustment

Note 1: Perform this adjustment, following the order described in "Caution" on the previous page.

PURPOSE	•To set the iris control data.
INCOMPLETED PHENOMENON	•The picture becomes too bright. •The picture becomes too dark.
TEST POINT	_____
EQUIPMENT/JIG	_____
CONDITION	•Point the camera at the light box without a chart to full the screen (at wide-angle).

PROCEDURE

ADJUSTMENT MENU

```

*****
***** ADJUSTMENT *****
*****
[1]  AUTO IRIS CONTROL
[2]  KNEE
[3]  MATRIX
[4]  WHITE BALANCE
[5]  CHROMA GAIN
[ESC] RETURN TO MAIN MENU
Please select [1], [2], [3], [4], [5] or [ESC]

```

Press **[1]** key to select the auto iris control.

<<ADJUSTMENT OF IRIS OPEN & CLOSE>>
PLEASE WAIT AROUND 10 SEC.

<<ADJUSTMENT OF IRIS OPEN & CLOSE>>
PLEASE WAIT AROUND 10 SEC.
DATA WRITTEN INTO EEPROM
ADJUSTMENT FINISHED
PRESS ANY KEY !

Press any key, and the display changes as follows.

<< ADJUSTMENT IRIS >>
PLEASE WAIT AROUND 20 SEC.

<< ADJUSTMENT IRIS >>
PLEASE WAIT AROUND 20 SEC.
ROUGH ADJUSTMENT : xx TIMES
FINE ADJUSTMENT : xx TIMES
ADJUSTMENT FINISHED
PRESS ANY KEY !

①
↓

Press any key, and the display changes as follows.

<< ADJUSTMENT OF HALLCURVE >>
PLEASE WAIT AROUND 30 SEC.
NTSC

※2
↓

<< ADJUSTMENT OF HALLCURVE >>
PLEASE WAIT AROUND 30 SEC.
NTSC

*
ADJUSTMENT POINT 0 1 2 3 4 A B C

<< ADJUSTMENT OF HALLCURVE >>
PLEASE WAIT AROUND 30 SEC.
NTSC

ADJUSTMENT POINT 0 1 2 3 4 A B C
DATA WRITTEN INTO EEPROM
ADJUSTMENT FINISHED
PRESS ANY KEY !

Press any key, and the display changes as follows.

ADJUSTMENT FINISHED
PRESS ANY KEY !

Press any key to return to ADJUSTMENT MENU.

Note 2: With some units the following parameter may not be displayed in the display marked ※1. This is normal; continue adjustment.

ROUGH ADJUSTMENT: xx TIMES

Note 3: The * mark flashes above the numerals and letters in sequence in the display marked ※2.

(2) Knee Adjustment (Fig. 2-18-1)

Note 1: Perform this adjustment, following the order described in "Caution" on the page before the previous page.

PURPOSE	•To determine the knee level.
INCOMPLETED PHENOMENON	•Colour in the very bright section is defective.
TEST POINT	•Video Out (AV OUT)
EQUIPMENT/JIG	•Oscilloscope (Waveform Monitor)
CONDITION	•Point at a gray scale chart.

PROCEDURE

ADJUSTMENT MENU

```

*****
***** ADJUSTMENT *****
*****
[1]  AUTO IRIS CONTROL
[2]  KNEE
[3]  MATRIX
[4]  WHITE BALANCE
[5]  CHROMA GAIN
[ESC] RETURN TO MAIN MENU
Please select [1], [2], [3], [4], [5] or [ESC]

```

Press **[2]** key to select the knee.

```

**** KNEE ADJUSTMENT **** STEP 1
* THIS ADJUSTMENT PERFORM WHEN REPLACING
  IC1101 or IC1106 only.
* IT NEED IRIS ADJUSTMENT HAVE PERFORMED
  COMPLETELY BEFORE.
  PERFORM THIS ADJUSTMENT *
  PLEASE POINT AT THE CHART AND
    PRESS THE FOLLOWING KEY
    GO TO NEXT STEP [ENTER]
    RETURN TO MENU  [ESC]

```

Press **[ENTER]** key to start the next step.

```

*** KNEE ADJUSTMENT *** STEP 1
*** WAIT A MOMENT ***

```

②

```

**** KNEE ADJUSTMENT **** STEP 2
SET LUMINANCE LEVEL TO
  100 (+/- 5) IRE OR 715 (+/- 35) mV
ROUGH ADJUSTMENT
[U]  UP
[D]  DOWN
FINE ADJUSTMENT
[Ctrl] + [U]  UP
[Ctrl] + [D]  DOWN
[ENTER]  DECISION

```

Press the **[U]** and **[D]** keys to set the amplitude level to around 715mVp-p.
Press the **[Ctrl]** key and hold it down, then press the **[U]** and **[D]** keys to adjust the amplitude level to 715mVp ± 35mVp-p.

Press **[ENTER]** key to start the next step.

```

**** KNEE ADJUSTMENT **** STEP 3
ADJUST THE LUMINANCE LEVEL TO
  THE LEVEL WHICH ADJUSTMENT STEP 2
ROUGH ADJUSTMENT
[U]  UP
[D]  DOWN
FINE ADJUSTMENT
[Ctrl] + [U]  UP
[Ctrl] + [D]  DOWN
[C]  CONFIRM THE LEVEL AT STEP 2
[ENTER]  DECISION

```

Press the **[U]** and **[D]** keys to bring the amplitude level near to the level in step 2.
Press the **[Ctrl]** key and hold it down, then press the **[U]** and **[D]** keys to match the amplitude level to that in step 2.

Press the **[C]** key. The level in step 2 can be checked.

```

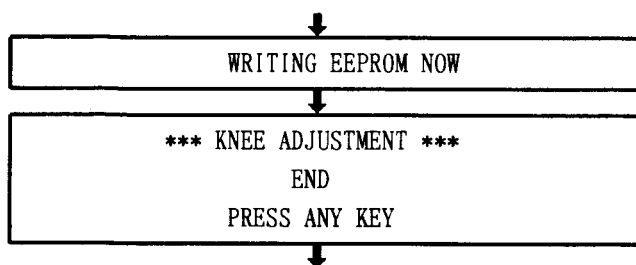
**** KNEE ADJUSTMENT **** STEP 3
HOW SHOW YOU THE LEVEL AT STEP 2.
RETURN TO BEFORE PICTURE [C]

```

③

③

Press **ENTER** key, and the display changes as follows.



Press any key to return to ADJUSTMENT MENU.

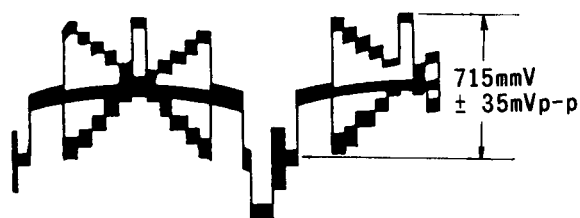


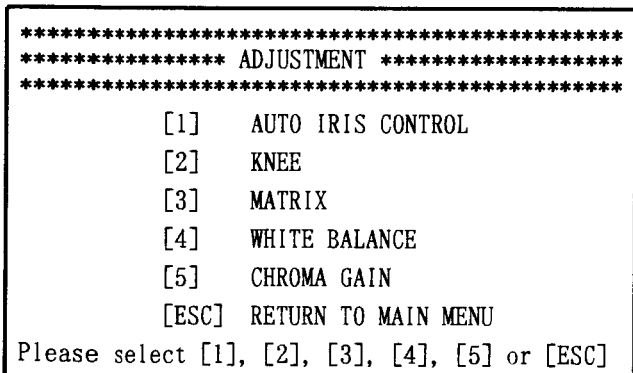
Fig. 2-18-1

(3) Matrix Adjustment (Fig. 2-18-2)

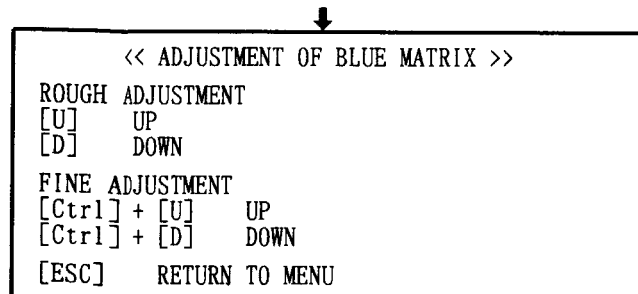
PURPOSE	To compensate for unevenness in the chroma signal.
INCOMPLETED PHENOMENON	Colour reproduction becomes defective.
TEST POINT	•Video Out (AV OUT)
EQUIPMENT/JIG	•Oscilloscope
CONDITION	•Point at a colour bar chart.

PROCEDURE

ADJUSTMENT MENU



Press **[3]** key to select the matrix.

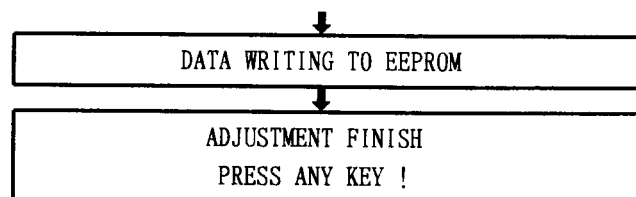


④

④

Press the **[D]** key to minimize the yellow (YEL) level. Press the **[U]** key so the ratio between yellow (YEL) and blue (BLU) levels is 6.5:7 (Hi-8 model is 4:6). Press the **Ctrl** key and hold it down, then press the **[U]** and **[D]** keys so the ratio between yellow (YEL) and blue (BLU) levels is 6.5:7 (Hi-8 model is 4:6).

Press **ENTER** key, and the display changes as follows.



Press any key to return to ADJUSTMENT MENU.

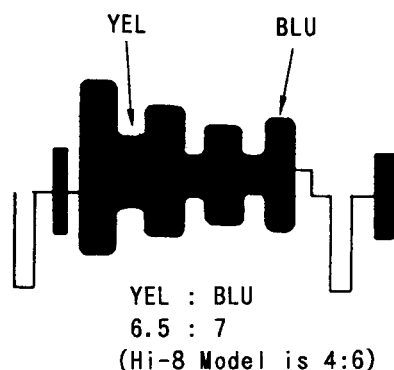


Fig. 2-18-2

(4) White Balance Adjustment

PURPOSE	To set white balance under the colour temperature which becomes a reference for the auto white balance circuit.
INCOMPLETED PHENOMENON	•Colour of the subject is different from that of the picture. •A white subject is not seen as white.
TEST POINT	•Video Out (AV OUT)
EQUIPMENT/JIG	_____
CONDITION	•Attach a C12 filter. •Point at a gray scale chart (at wide-angle).

PROCEDURE

ADJUSTMENT MENU

***** ***** ADJUSTMENT ***** *****	
[1]	AUTO IRIS CONTROL
[2]	KNEE
[3]	MATRIX
[4]	WHITE BALANCE
[5]	CHROMA GAIN
[ESC]	RETURN TO MAIN MENU
Please select [1], [2], [3], [4], [5] or [ESC]	

Press **[4]** key to select the white balance.

WHITE BALANCE ADJUSTMENT

INPUT DATA OF OFFSET FOR R-B --> 00

Input the data.

8mm Model : **[2]** **[B]**
Hi-8 Model : **[2]** **[D]**

Press **ENTER** key, and the display changes as follows.

⑤

WHITE BALANCE ADJUSTMENT

INPUT DATA OF OFFSET FOR Mg-G --> 00

Input the data.

8mm Model : **[1]** **[F]**
Hi-8 Model : **[2]** **[1]**

Press **ENTER** key, and the display changes as follows.

WHITE BALANCE ADJUSTMENT

PLEASE WAIT A MOMENT

WHITE BALANCE ADJUSTMENT

Adjustment completed.

Completed EEPROM writing.

PRESS ANY KEY

Press any key to return to ADJUSTMENT MENU.

(5) Chroma Gain Adjustment (Figs. 2-19, 2-20)

PURPOSE	To set the colour saturation under the reference colour temperature.
INCOMPLETED PHENOMENON	•Colour of the picture is denser than that of the subject. •Colour of the picture is lighter than that of the subject.
TEST POINT	•Video Out (AV OUT)
EQUIPMENT/JIG	•Oscilloscope (Vectorscope)
CONDITION	•Attach a C12 filter. •Point at a colour bar chart.

PROCEDURE

ADJUSTMENT MENU

***** ADJUSTMENT *****	

[1]	AUTO IRIS CONTROL
[2]	KNEE
[3]	MATRIX
[4]	WHITE BALANCE
[5]	CHROMA GAIN
[ESC]	RETURN TO MAIN MENU
Please select [1], [2], [3], [4], [5] or [ESC]	

Press **[5]** key to select the chroma gain.

<< ADJUSTMENT OF CHROMA GAIN >>	
ROUGH ADJUSTMENT	
[U]	CHROMA GAIN UP
[D]	CHROMA GAIN DOWN
FINE ADJUSTMENT	
[Ctrl] + [U]	CHROMA GAIN UP
[Ctrl] + [D]	CHROMA GAIN DOWN
[ENTER]	RETURN TO MENU

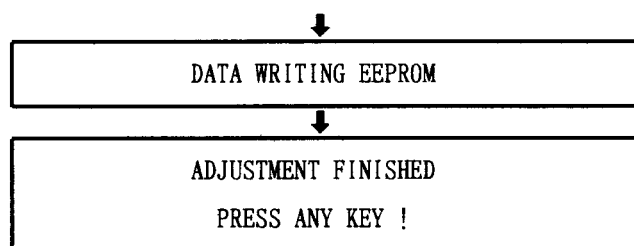
WHEN USING AN OSCILLOSCOPE

Press the **[U]** and **[D]** keys to set the red level to around 400mVp-p.
 Press the **[Ctrl]** button and hold it down, then press the **[U]** and **[D]** keys so the red level is $400\text{mV} \pm 20\text{mVp-p}$. (Fig. 2-19)

WHEN USING A VECTORSCOPE

Press the **[U]** and **[D]** keys to set the red vector to around 140% of the burst.
 Press the **[Ctrl]** button and hold it down, then press the **[U]** and **[D]** keys so the red vector is $140\% \pm 5\%$. (Fig. 2-20)

Press **[ENTER]** key, and the display changes as follows.



Press any key to return to ADJUSTMENT MENU.

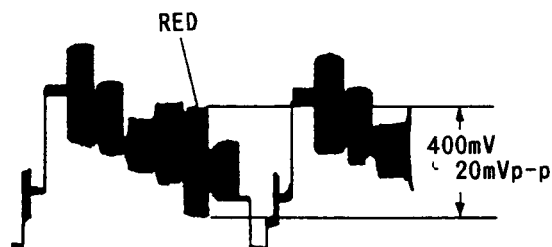


Fig. 2-19

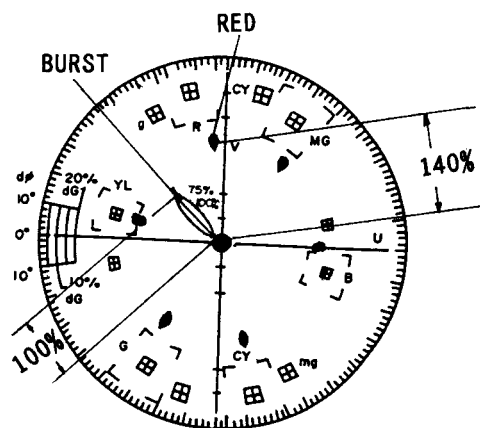


Fig. 2-20

2.7.6 Autofocus Adjustment Procedure

Note 1: Be sure to perform this adjustment after replacing or initializing the lens block, parts in the autofocus circuit and main circuit board (EEPROM).

Note 2: When an error message appears during adjustment, refer to "4. Error Messages".

- 1) Start MAP, referring to "2.7.2 How to Start the Adjustment Programme (MAP)".
- 2) Press **[D]** to select AUTO FOCUS. (Figs. 2-21, 2-22 AND 2-23.)
- 3) Select the number of the required adjustment.

Note 3: If **[ESC]** (escape) is pressed, the computer's display returns to Fig. 2-21 (MAIN MENU).

Note 4: To complete adjustment, press the **[ESC]** (escape) key twice to restore the MS-DOS screen and then turn off the camera/recorder and jig.

MAIN MENU

```

*****
***** MANUAL ADJUSTMENT PROGRAM *****
*****
[A] DATA INITIALIZE
[B] ELECTRIC VOLUME
[C] ADJUSTMENT
[D] AUTO FOCUS
[E] VCR ADJUSTMET
[ESC] END
Please select [A], [B], [C], [D], [E] or [ESC]

```

Fig. 2-21



Press **[D]**

TOOL FOR ADJUSTING AUTO FOCUS SYSTEM

Fig. 2-22



AF ADJ. MENU

```

*****
***** AUTO FOCUS ADJUSTMENT *****
*****
[1] ADJUSTMENT OF ZOOM TRACE
[2] ADJUSTMENT OF AF NOISE LEVEL
[ESC] RETURN TO MENU
Please select [1], [2] or [ESC]

```

Fig. 2-23

(1) Zoom Trace Adjustment

PURPOSE	•To set the out-of-focus correction level during zooming.
INCOMPLETED PHENOMENON	•Focus is lost during zooming.
EQUIPMENT/JIG	•Colour Video Monitor •Backfocus Chart
TEST POINT	•Video Out (AV OUT)
CONDITION	•Point at the backfocus chart, 1500±5 mm away from the lens surface. •Light the chart with 200-400 lux.

Note 1: Measure the distance between the chart and lens surface precisely.

Note 2: Place the chart as parallel as possible to the lens surface.

Note 3: The backfocus chart should always be at the centre of the monitor screen when the zoom is set to the wide-angle and telephoto ends.

Note 4: The zoom trace adjustment procedure is completed within 2 minutes after it is selected.

Note 5: Do not place any obstruction between the lens and chart during adjustment.

PROCEDURE

AF ADJ. MENU

```

*****
***** AUTO FOCUS ADJUSTMENT *****
*****
[1] ADJUSTMENT OF ZOOM TRACE
[2] ADJUSTMENT OF AF NOISE LEVEL
[ESC] RETURN TO MENU
Please select [1], [2] or [ESC]

```



Press **[1]** key to select ADJUSTMENT OF ZOOM TRACE.



ADJUSTMENT OF BACKFOCUS STARTED



ADJUSTMENT OF BACKFOCUS STARTED
AF ADJUSTMENT STARTED



ADJUSTMENT OF BACK FOCUS STARTED
AF ADJUSTMENT STARTED
ADJUSTMENT OF BACK FOCUS COMPLETED

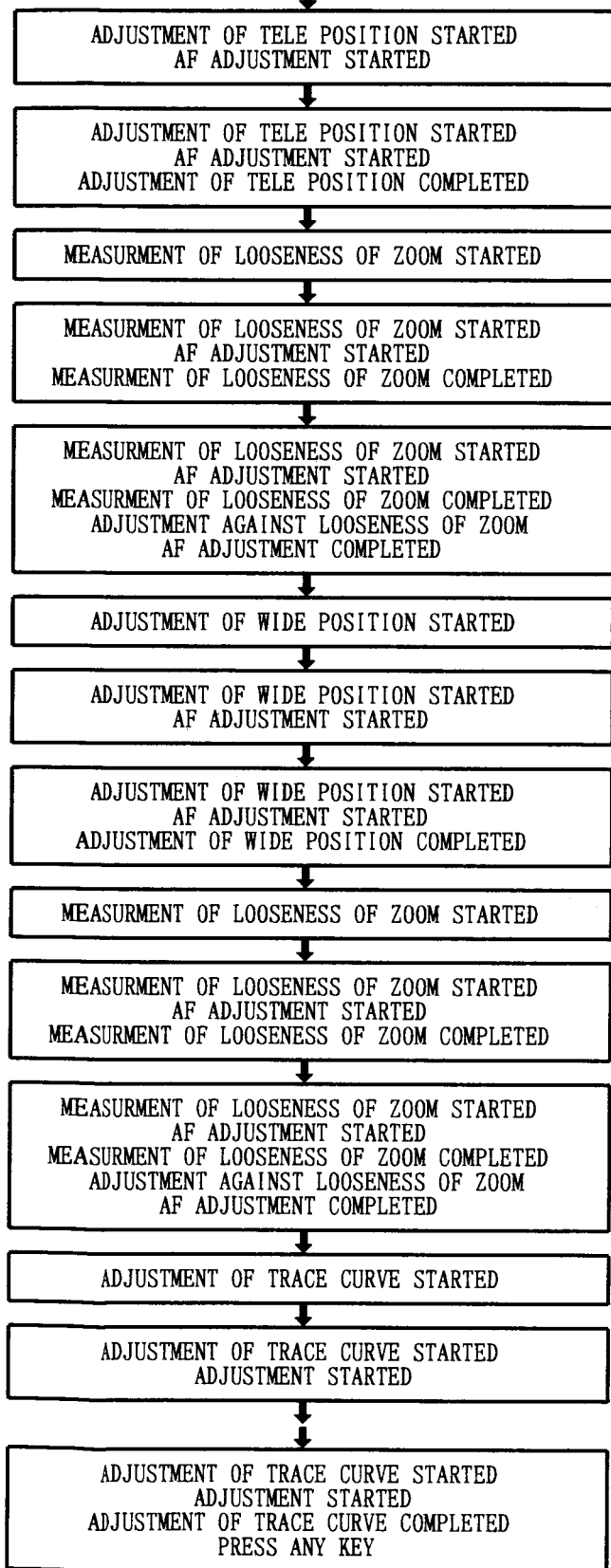


ADJUSTMENT OF TELE POSITION STARTED



①

①



Press any key to return to AF ADJ. MENU.



Turn the power off and then on again.

(2) AF Noise Level Adjustment

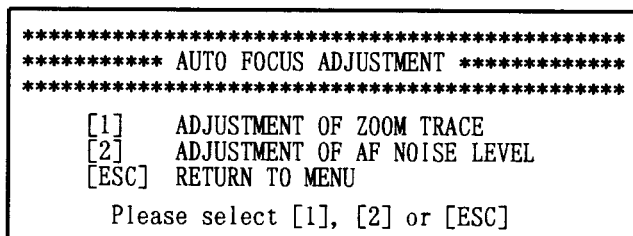
PURPOSE	•To set the noise level.
INCOMPLETED PHENOMENON	•It takes time until a subject is brought into focus. •Correct focus is not obtained.
EQUIPMENT/JIG	•Colour Video Monitor
TEST POINT	•Video Out (AV OUT)
CONDITION	•Set the focus to AUTO. •Point at a light box without a chart inserted at a distance of up to 10cm.

Note 1: Place the light box as parallel as possible to the lens surface.

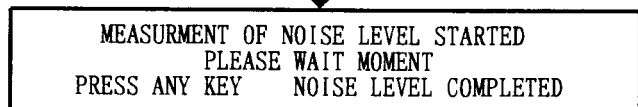
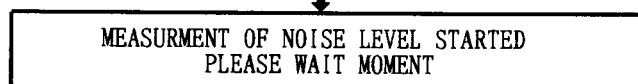
Note 2: The AF noise level adjustment procedure will be completed within a minute after it is selected.

PROCEDURE

AF ADJ. MENU



Press [2] key to select ADJUSTMENT OF AF NOISE LEVEL.



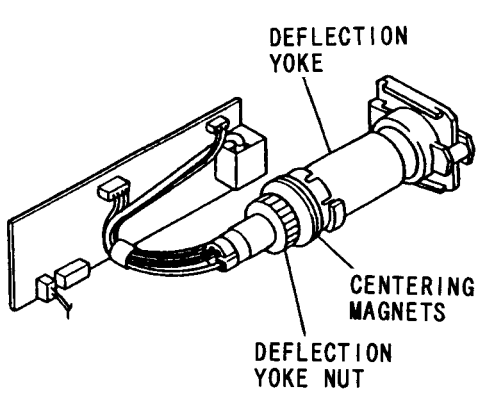
Press any key to return to AF ADJ. MENU.



Turn the power off and then on again.

2.8 ELECTRONIC VIEWFINDER (EVF) ADJUSTMENT

(1) Deflection Yoke Position Adjustment (Fig. 2-51)

PURPOSE	This adjustment procedure eliminates picture tilt in the EVF display.			
EQUIPMENT/JIG	TEST POINTS	CONDITION	ADJUST POINTS	SPECIFICATION
•EVF Display		•Aim the resolution chart.	•Deflection Yoke	
1) Loosen the deflection yoke nut. 2) Turn the deflection yoke so that the EVF picture (chart) is horizontal, matching the edges of the CRT. Note: After adjustment is completed, tighten the deflection yoke nut.				
				
Fig.2-51				

(2) EVF Centring Adjustment (Fig. 2-51)

PURPOSE	This adjustment centres the image observed by the camera in the EVF display.			
EQUIPMENT/JIG	TEST POINTS	CONDITION	ADJUST POINTS	SPECIFICATION
•EVF Display		•Aim the resolution chart.	•CENTRING MAGNETS	
1) Remove the locking paint from the centring magnet. 2) Adjust the centring magnets until the centre of the picture viewed by the camera is positioned in the centre of the EVF display.				

(3) EVF Vertical Size Adjustment (Fig. 2-52)

PURPOSE	This adjustment determines the vertical size of the image appearing in the EVF display			
EQUIPMENT/JIG	TEST POINTS	CONDITION	ADJUST POINTS	SPECIFICATION
•EVF Display		•Aim the resolution chart.	•RT2003 EVF (V.SIZE)	
1) Adjust RT2003 so that the top and bottom edges of the chart match the top and bottom edges of the CRT.				

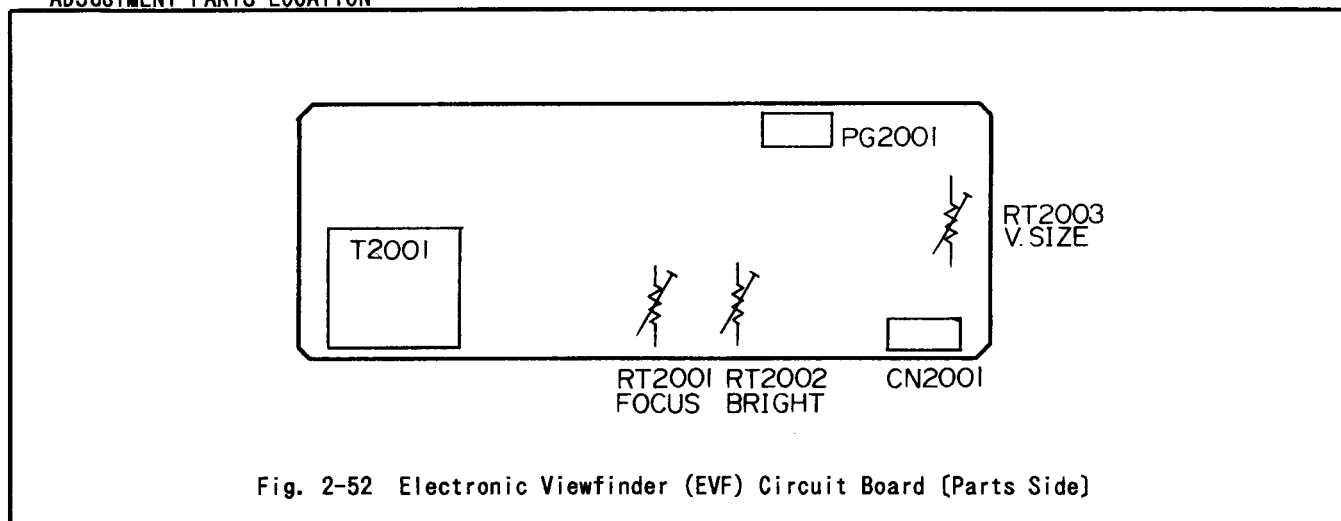
(4) EVF Brightness Adjustment (Fig. 2-52)

PURPOSE	This adjustment sets the brightness of the picture in the EVF display.			
EQUIPMENT/JIG	TEST POINTS	CONDITION	ADJUST POINTS	SPECIFICATION
•EVF Display		•Aim the resolution chart.	•RT2002 EVF (BRIGHT)	
1) Adjust RT2002 to optimize the EVF picture.				

(5) EVF Focus Adjustment (Fig. 2-52)

PURPOSE	This control adjusts for optimum focus of the electronic viewfinder picture.			
EQUIPMENT/JIG	TEST POINTS	CONDITION	ADJUST POINTS	SPECIFICATION
•EVF Display		•Aim the resolution chart.	•RT2001 (FOCUS)	EVF
1) Adjust RT2001 so that the EVF picture is clear.				

ADJUSTMENT PARTS LOCATION



3. VTR SECTION ADJUSTMENT

3.1 CIRCUIT BOARD LOCATIONS

1. Main Circuit Board
2. Sensor Circuit Board
3. T/W SW Unit
4. REC SW/Batt. Circuit Board

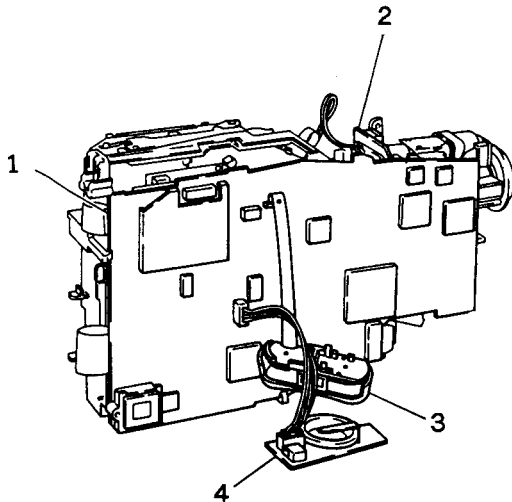


Fig. 3-1

3.2 TEST EQUIPMENT AND ALIGNMENT TAPES NECESSARY FOR ADJUSTMENT

- Test Equipment
 - Oscilloscope (dual trace)
 - Digital Voltmeter (DVM)
 - Frequency Counter
 - Millivoltmeter
 - Colour Video Monitor
 - Colour Bar Generator
 - C/R Oscillator
- Alignment Tape, etc.
 - Adjustment Floppy Disk
 - Personal Computer
 - Personal Computer 9-pin or 25-pin (RS232C) Cable
 - DSP-R Jig
 - DSP AV Output Cable
 - Alignment Tape (20HSC-3)
 - Blank Tape
 - ATF-R Jig
 - DC Power Supply (DC 0~7V/3A)
 - DC Power Supply (DC 5V/1A)

3.3 ADJUSTMENT CONDITION

- 1) Check that the camera section has been adjusted correctly before adjusting the VTR section
- 2) Connect this unit, a power supply and a colour video monitor as shown in Fig. 1-1.
- 3) Use the 10:1 probe of the oscilloscope when other not specified.
- 4) When "Record mode" is specified, load a blank tape and set the 8mm video camera/recorder to the record mode by the following procedure.
 - ① Set the CAMERA/OFF/VIDEO switch to the CAMERA position.
 - ② Press the REC START/STOP button on the unit (or REC START/STOP button on the remote control).
- 5) Before adjusting the resistors marked with asterisks (*) in the following text, remove the corresponding laser trimming resistors to replace them with the specified semi-variable resistors.
- 6) Before unsoldering laser trimming resistors be sure to confirm each adjustment value. Remove only the resistors used in the adjustment items that should be adjusted.

3.4 PRESET POSITIONS OF SWITCHES AND CONTROLS DURING ADJUSTMENT

- CAMERA/OFF/VIDEO switch "VIDEO" position
- TITLE Not Display mode

The video and audio signals can be input to a model without the AV input function in the following two ways.

Note: The following methods are used for adjustment and checking. Do not use them for any purposes other than adjustment or checking.

- Modify the AV input cable.
Change the connection of pin 13 of the AV input cable from ground to pin 2 (DC5V).
(After checking that pin 13 and ground are not connected, connect pin 13 to pin 2 (DC5V)).

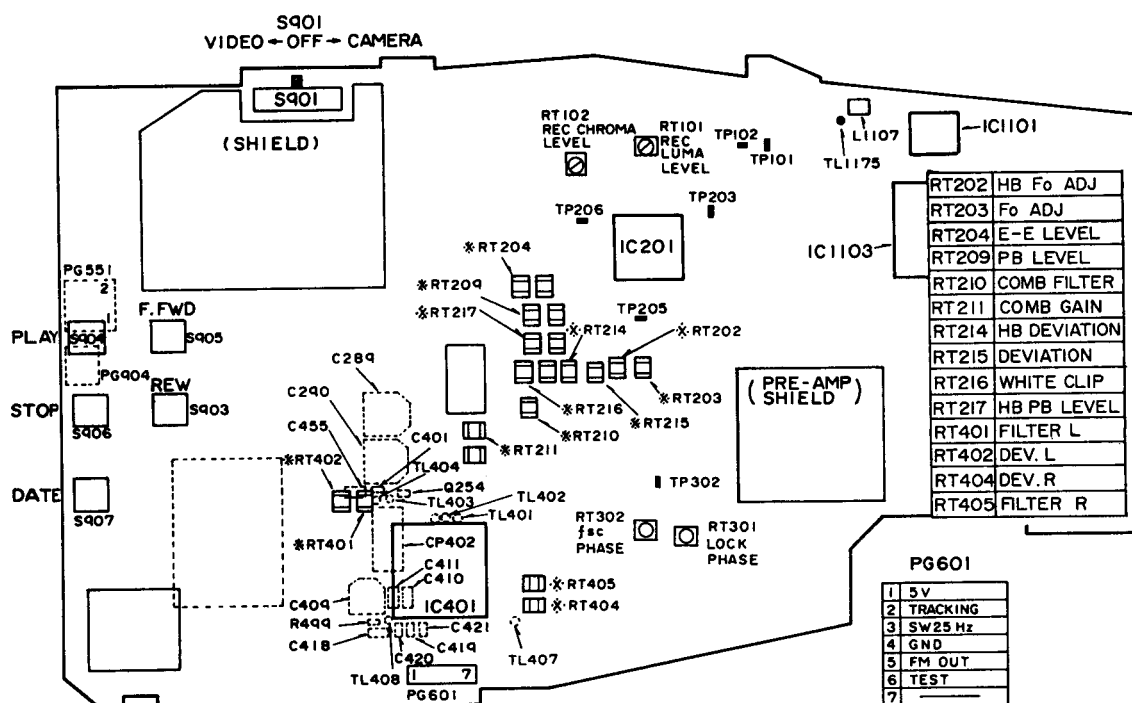
3.5 ADJUSTMENT COMPONENTS LOCATIONS

Note 1 : Before adjusting the resistors marked with asterisks shown in the adjustment parts location diagram, remove the laser trimming resistors to replace them with semi-variable resistors (shown in Table 3-1).

Note 2: Adjust (turn) the soldered semi-variable resistor within the range shown in Fig. 3-3.

Table 3-1

ADJUST POINT	SEMI-VARIABLE RESISTOR (Ω)	C. B. A	NAME OF ADJUSTMENT
RT202	10 k	MAIN	HB F ₀ ADJ
RT203	10 k	MAIN	F ₀ ADJ
RT204	10 k	MAIN	E-E LEVEL
RT209	10 k	MAIN	PB LEVEL
RT210	470	MAIN	COMB PHASE
RT211	4.7 k	MAIN	COMB GAIN
RT214	4.7 k	MAIN	HB DEVIATION
RT215	10 k	MAIN	DEVIATION
RT216	22 k	MAIN	WHITE CLIP
RT217	10 k	MAIN	HB PB LEVEL
RT401	47 K	MAIN	FILTER L
RT402	47 k	MAIN	DEV. L
RT404	47 k	MAIN	DEV. R
RT405	47 k	MAIN	FILTER R



*Note: Variable resistors marked * are leaser trimming resistor.*

Fig. 3-2 Main (MAIN) Circuit Board

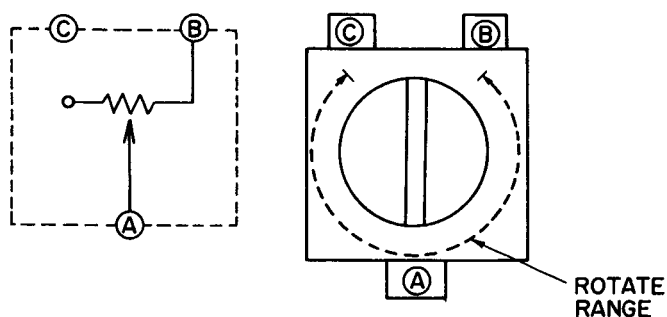


Fig. 3-3

3.6 ADJUSTMENTS AFTER REPLACING MAJOR COMPONENTS IN THE VTR SECTION

After replacing major components, perform adjustments, referring to the table below. The following table shows the minimum adjustments required after major components are placed. The table below may not apply when several components are replaced, depending on the symptom of the defect.

Note: After replacing the parts, check each adjustment. If you find the items necessary to be adjusted, remove the corresponding laser trimming resistors and replace them with variable resistors for adjustment.

ITEM No.	NAME OF ADJUSTMENT	NAME OF MAJOR COMPONENTS						
		MAIN C.B.A	CYLINDER	IC901	IC201	IC202	IC401	IC301
SYSTEM CONTROL/SERVO CIRCUITS ADJUSTMENT								
(1)	Power Shut Off Level Adjustment	●		●				
(2)	Head Switching Point Adjustment	●	●	●				
LUMINANCE/CHROMA CIRCUIT ADJUSTMENT								
(1)	Comb Filter Adjustment				●	●		
(2)	E-E Video Signal Levl Adjustment				●			
(3)	White Clip Adjustment				●			
(4)	Carrier Frequency Adjustment				●			
(5)	Deviation Adjustment				●			
(6)	Record Luminance/Chroma level Adjustment				●			
(7)	Playback Luminance Level Adjustment				●			
(8)	Colour Alignment Adjustment				●			●
AUDIO CIRCUIT ADJUSTMENT								
(1)	Band Pass Filter (BPF) Adjustment						●	
(2)	Deviation Adjustment						●	

3.7 SYSTEM CONTROL/SERVO CIRCUIT ADJUSTMENT

Note 1: System control/servo adjustment also needs a personal computer. Connect the camera/recorder, jigs, power supply, etc. in the same way as in Digital Adjustment.

Note 2: Be sure to perform this adjustment after replacing or initializing the EEPROM and main circuit board (EEPROM).

Note 3: When an error message appears during adjustment, refer to "4. Error Messages".

- 1) Start the MAP, referring to "2.7.2 How to Start the Adjustment Programme (MAP)"
- 2) Press **[E]** to select VCR ADJUSTMENT. (Figs. 3-4, 3-5)
- 3) Select the number of the required adjustment.

Note 3: If **[ESC]** (escape) is pressed, the computer's display returns to Fig. 3-4 (MAIN MENU).

Note 4: To complete adjustment, press the **[ESC]** (escape) key twice to restore the MS-DOS screen and then turn off the camera/recorder and jig.

MAIN MENU

```

*****
***** MANUAL ADJUSTMENT PROGRAM *****
*****
[A]  DATA INITIALIZE
[B]  ELECTRIC VOLUME
[C]  ADJUSTMENT
[D]  AUTO FOCUS
[E]  VCR ADJUSTMET
[ESC] END
Please select [A], [B], [C], [D], [E] or [ESC]

```

Fig. 3-4



Press **[E]**



VTR ADJ. MENU

```

*****
***** VCR ADJUSTMENT *****
*****
[1]  ADJUSTMENT OF ODC
[2]  ADJUSTMENT OF SWITCHING POINT
[ESC] RETURN TO MAIN MENU
Please select [1], [2] or [ESC]

```

Fig. 3-5

(1) Power Shut Off Level (ODC : Over Discharge) Adjustment

PURPOSE	•To set the minimum voltage required to operate the camera/recorder.
INCOMPLETED PHENOMENON	•The usable time of the battery becomes short. •The camera/recorder does not operate normally.
TEST POINT	PG551-2 MAIN PG551-1 (GND) MAIN
EQUIPMENT/JIG	•DC Power Supply (0 ~ 7V) •DVM •Blank tape
CONDITION	•Load the blank tape. •Connect the DC power supply to PG551. •Set the voltage of PG551-1 to 5.65V ± 0.05V.

PROCEDURE

VTR ADJ. MENU

```

*****
***** VCR ADJUSTMENT *****
*****
[1]  ADJUSTMENT OF ODC
[2]  ADJUSTMENT OF SWITCHING POINT
[ESC] RETURN TO MAIN MENU
Please select [1], [2] or [ESC]

```

Press **[1]** key to select the adjustment of ODC.

```

<< SET UP OF ODC ADJUSTMENT STARTED >>
SET POWER SOURCE AT 5.65 (+/- 0.05) V.
START ADJUSTING.  PRESS ANY KEY.

```

Press any key, and the display changes as follows.

```

<< SETUP OF ODC ADJUSTMENT COMPLETED >>
<< ODC ADJUSTMENT STARTED >>
<< ODC ADJUSTMENT COMPLETED >>
PRESS ANY KEY

```

Press any key to return to VTR ADJ. MENU.

(2) Head Switching Point Adjustment

PURPOSE	•To set the switching point of the video heads during playback.
INCOMPLETED PHENOMENON	•Vertical jitter occurs. •Switching noise appears across the bottom of the monitor screen.
TEST POINT	
EQUIPMENT/JIG	•Alignment Tape
CONDITION	•Load the alignment tape.

PROCEDURE

VTR ADJ. MENU

```

*****
***** VCR ADJUSTMENT *****
*****
[1]  ADJUSTMENT OF ODC
[2]  ADJUSTMENT OF SWITCHING POINT
[ESC] RETURN TO MAIN MENU
Please select [1], [2] or [ESC]

```

Press **[2]** key to select the adjustment of SWITCHING POINT.

```

<< SET UP OF SW POINT ADJUSTMENT STARTED >>
<< SETUP OF SW POINT ADJUSTMENT COMPLETED >>

```

```

<< SW POINT ADJUSTMENT STARTED >>

```

```

<< SW POINT ADJUSTMENT DATA CHECKING >>
<< ADJUSTMENT DATA WRITING STARTED >>
<< ADJUSTMENT DATA WRITING COMPLETED >>
PRESS ANY KEY

```

Press any key to return to VTR ADJ. MENU.

3.8 LUMINANCE/CHROMA CIRCUIT ADJUSTMENT

(1) Comb Filter Adjustment (Figs. 3-2, 3-6)

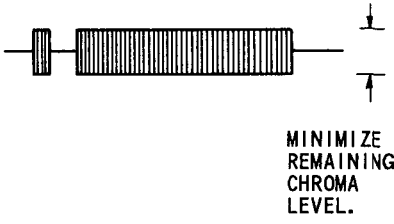
PURPOSE	• To set the characteristic of the comb filter.			
INCOMPLETED PHENOMENON	• Jamming occurs at the edges. • The chroma S/N deteriorates.			
EQUIPMENT/JIG	TEST POINTS	CONDITION	ADJUST POINTS	SPECIFICATION
• Oscilloscope • Colour Bar Generator • Blank Tape	• TP203 MAIN • Pre-amp Shield (GND) • Video Out (AV OUT)	• Input the colour bar signal. • STOP mode	• RT211 (COMB GAIN) MAIN • RT210 MAIN	Minimize the residual chroma components. (COMB PHASE)
1) Load the blank tape for normal 8. 2) Connect the oscilloscope to TP203. 3) Trigger the oscilloscope at video signal. 4) Adjust RT210 and RT211 to minimize the residual chroma components.				

Fig. 3-6

(2) E-E Video Signal Level Adjustment (Figs. 3-2, 3-7)

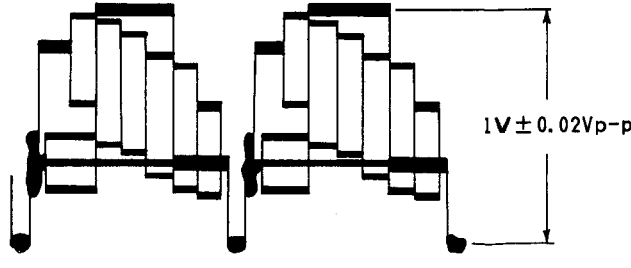
PURPOSE	• To set the video output level in the E-E mode.			
INCOMPLETED PHENOMENON	• The picture becomes dark or whitish in the E-E mode.			
EQUIPMENT/JIG	TEST POINTS	CONDITION	ADJUST POINTS	SPECIFICATION
• Oscilloscope • Colour Bar Generator • Blank Tape	• Video Out (AV OUT) • Pre-amp Shield (GND)	• Input the colour bar signal. • Stop mode	• RT204 MAIN (E-E LEVEL)	• $1V \pm 0.02V_{p-p}$
1) Load the blank tape for normal 8. 2) Connect the oscilloscope to video out. 3) Adjust RT204 for $1V \pm 0.02V$.				

Fig. 3-7

(3) White Clip Adjustment (Figs. 3-2, 3-8)

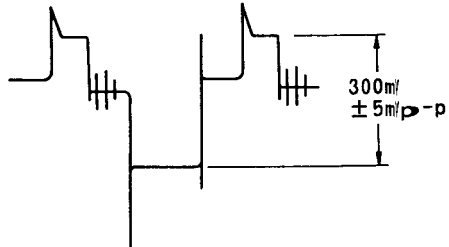
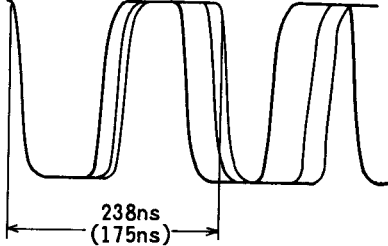
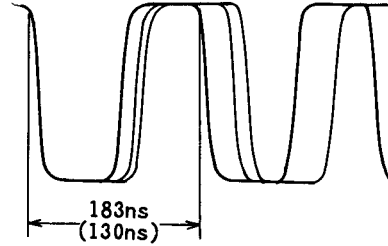
PURPOSE	• To set the white clip level.			
INCOMPLETED PHENOMENON				
EQUIPMENT/JIG	TEST POINTS	CONDITION	ADJUST POINTS	SPECIFICATION
• Oscilloscope • Colour Bar Generator • Blank Tapes	• TP205 MAIN • Pre-amp Shield (GND) • Video Out (AV OUT)	• Input the colour bar signal. • Stop mode	• RT216 MAIN (WHITE CLIP)	• $300mV \pm 5mV_{p-p}$
1) Load the blank tape for normal 8. 2) Connect the oscilloscope to TP205. 3) Trigger the oscilloscope at video signal. 4) Adjust RT216 for $300mV \pm 5mV_{p-p}$				

Fig. 3-8

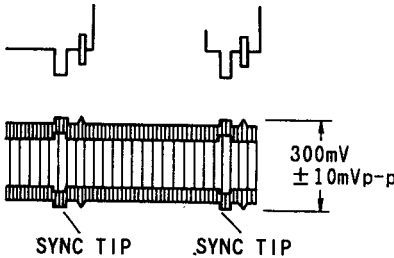
(4) Carrier Frequency Adjustment (Figs. 3-2, 3-9)

PURPOSE	• To set the modulation frequency at the sync tip of the FM modulator to the specified value.			
INCOMPLETED PHENOMENON	• Black and white are inverted in the picture.			
EQUIPMENT/JIG	TEST POINTS	CONDITION	ADJUST POINTS	SPECIFICATION
• Oscilloscope • Colour Bar Generator • Blank Tapes	• TP206 MAIN • Pre-amp Shield (GND)	• Input the white (100%) signal. • Stop mode.	• *RT203 MAIN (Fo ADJ) • *RT202 MAIN (HB Fo ADJ)	• 238ns $\pm$ 3ns • 175ns $\pm$ 3ns
1) Load the blank tape for normal 8. 2) Connect the oscilloscope to TP206. 3) Trigger the oscilloscope internally. 4) Adjust RT203 so the period of the widest pulse is 238ns $\pm$ 3ns. 5) Load the blank tape for Hi-8. 6) Adjust RT202 so the period of the widest pulse is 175ns $\pm$ 3ns.		 Fig. 3-9		

(5) Deviation Adjustment (Figs. 3-2, 3-10)

PURPOSE	• To set the modulation frequency at the white peak of the FM modulator to the specified value.			
INCOMPLETED PHENOMENON	• The picture becomes dark or whitish during recording and playback.			
EQUIPMENT/JIG	TEST POINTS	CONDITION	ADJUST POINTS	SPECIFICATION
• Oscilloscope • Colour Bar Generator • Blank Tapes	• TP206 MAIN • Pre-amp Shield (GND)	• Input the white (100%) signal. • Stop mode.	• *RT215 MAIN (DEVIATION) • *RT214 MAIN (HB DEVIATION)	• 185ns $\pm$ 2ns • 130ns $\pm$ 2ns
1) Load the blank tape for normal 8. 2) Connect the oscilloscope to TP206. 3) Trigger the oscilloscope internally. 4) Adjust RT215 so the period of the narrowest pulse is 185ns $\pm$ 2ns. 5) Load the blank tape for Hi-8. 6) Adjust RT214 so the period of the narrowest pulse is 130ns $\pm$ 2ns.		 Fig. 3-10		

(6) Record Luminance/Chroma Level Adjustment (Figs. 3-2, 3-11, 3-12)

PURPOSE	• To set the luminance and chroma signals to the specified values.			
INCOMPLETED PHENOMENON	• The luminance and chroma S/Ns deteriorate. • Cross-beats appear on the monitor screen. • Black and white are inverted in picture.			
EQUIPMENT/JIG	TEST POINTS	CONDITION	ADJUST POINTS	SPECIFICATION
• Oscilloscope • Colour Bar Generator • ATF-R Jig (SW3:ON) • Blank Tape	• TP101 (REC LUMA) MAIN • TP102 (REC CHROMA) MAIN • Pre-amp Shield (GND) • Video Out (AV IN/OUT)	• Input the colour bar signal. • Connect the ATF-R jig to PG601.	• RT101 MAIN (REC LUMA LEVEL) • RT102 MAIN (REC CHROMA LEVEL)	• 300mV $\pm$ 10mVp-p • 160mV $\pm$ 5mVp-p
1) Load the blank tape for Hi-8. 2) Connect the ATF-R jig to PG601 and turn the power off. 3) Press the REW button and hold it, then set the POWER switch to CAMERA position. 4) Set the unit to the loading state. 5) Connect the oscilloscope to TP101. 6) Trigger the oscilloscope at video signal. 7) Adjust RT101 so that the sync tip section in record luminance signal is 300mV $\pm$ 10mVp-p. (Fig. 3-11)		 Fig. 3-11		

- 8) Connect the oscilloscope to TP102.
- 9) Adjust RT102 so that the burst section in record chroma signal is $160\text{mV} \pm 5\text{mVp-p}$. (Fig. 3-12)

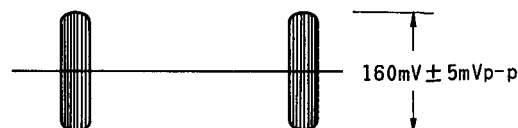


Fig. 3-12

(7) Playback Luminance Level Adjustment (Figs. 3-2, 3-13)

Note: Perform this adjustment after completing the record luminance/chroma level adjustment.

PURPOSE	To set the luminance playback level to the specified value.			
INCOMPLETED PHENOMENON	The picture becomes dark or whitish during playback.			
EQUIPMENT/JIG	TEST POINTS	CONDITION	ADJUST POINTS	SPECIFICATION
•Oscilloscope •Alignment Tape •Blank Tape •Colour Bar Generator	•Video Out (AV OUT) •Pre-amp Shield (GND)	•Playback the alignment tape.	•RT209 MAIN (PB LEVEL) •RT217 MAIN (HB PB LEVEL)	• $1\text{V} \pm 0.02\text{Vp-p}$
1) Connect the oscilloscope to video out. 2) Adjust RT209 for $1\text{V} \pm 0.02\text{V}$. 3) Input the colour bar signal. 4) Using a Hi-8 type blank tape, make a recording and play it back. 5) Adjust RT217 for $1\text{V} \pm 0.02\text{V}$.				



Fig. 3-13

(8) Colour Alignment Adjustment (Figs. 3-2, 3-14)

PURPOSE	To set the tint in the colour alignment circuit.			
INCOMPLETED PHENOMENON	No colour appears during trick play or colour reproduction becomes defective.			
EQUIPMENT/JIG	TEST POINTS	CONDITION	ADJUST POINTS	SPECIFICATION
•Vectorscope •Alignment Tape •ATF-R Jig	•TP302 MAIN •Video Out (A/V OUT) •Pre-amp Shield (GND)	•Playback the alignment tape.	•RT301 MAIN (LOCK PHASE) •RT302 MAIN (fsc PHASE)	
1) Connect a vectorscope terminated with 75 ohms to the video output (AV OUT). 2) Connect the ATF-R jig to PG601 and turn the power off. 3) Press the FF button and hold it, then set the POWER switch to the VIDEO position so the unit enters the test mode (used exclusively for colour alignment adjustment). 4) Press the PLAY button and playback the alignment tape. 5) Supply power (5V DC) to TP302 via a $1\text{k}\Omega$ resistor. 6) Check the YL chroma phase. 7) Press the PLAY button. 8) Adjust RT302 so the VL chroma phase is aligned (± 10 deg.) before and after the PLAY button is pressed.				

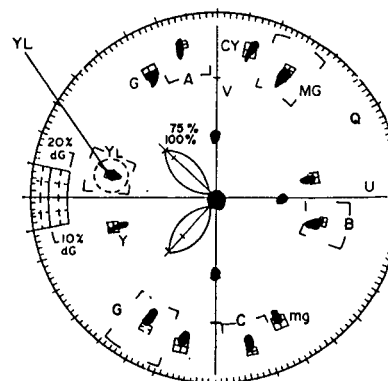


Fig. 3-14

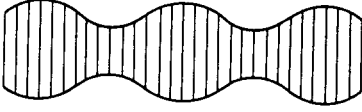
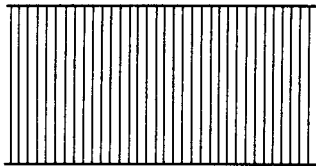
- 9) Press the PLAY button.
- 10) Connect TP302 to ground via a $1k\Omega$ resistor.
- 11) Check the YL chroma phase.
- 12) Press the PLAY button.
- 13) Adjust RT301 so the YL chroma phase is aligned (± 10 deg.) before and after the PLAY button is pressed.
- 14) Perform steps 5) - 13) again.

Note: When the PLAY button is pressed after the unit is set to the test mode, the unit enters the normal play mode. When the PLAY button is pressed again, the unit enters the colour alignment adjustment mode. Each time the PLAY button is pressed, the unit alternates between the normal play mode and the colour alignment adjustment mode.

3.9 AUDIO CIRCUIT ADJUSTMENT

Note: Before adjusting the audio circuits, prepare a tape on which 1kHz, -7.8dB audio signals are recorded on the L and R channels (referred to as the audio tape hereafter).

(1) Band Pass Filter (BPF) Adjustment (Figs. 3-2, 3-15, 3-16)

PURPOSE	• To set the bandpass frequency of the BPF.			
INCOMPLETED PHENOMENON	• No audio output.			
EQUIPMENT/JIG	TEST POINTS	CONDITION	ADJUST POINTS	SPECIFICATION
• Oscilloscope	• TL403 MAIN • TL402 MAIN • Audio GND (AV IN/OUT)	• Playback the Audio Tape	• RT401 MAIN (FILTER L) • RT405 MAIN (FILTER R)	
1) Connect the oscilloscope to TL403. 2) Trigger the oscilloscope at SW25. 3) Adjust RT401 so the waveform is as shown in Figs. 3-15 and 3-16. 4) Connect the oscilloscope to TL402. 5) Adjust RT405 so the waveform is as shown in Figs. 3-15 and 3-16.		 BAD  GOOD		
		Fig. 3-15		
		Fig. 3-16		

(2) Deviation Adjustment (Fig. 3-2)

PURPOSE	• Set the audio output level.			
INCOMPLETED PHENOMENON	• Audio levels are different.			
EQUIPMENT/JIG	TEST POINTS	CONDITION	ADJUST POINTS	SPECIFICATION
• Millivoltmeter	• TL408 MAIN • TL407 MAIN • Audio GND (AV IN/OUT)	• Playback the Audio Tape.	• RT402 MAIN (DEV. L) • RT404 MAIN (DEV. R)	-15dBs $\pm$ 0.5dB (138mVrms $\pm$ 8mVrms)
1) Connect the millivoltmeter to TL408. 2) Adjust RT402 for -15dBs $\pm$ 0.5dB (138mVrms $\pm$ 8mVrms). 3) Connect the millivoltmeter to TL407. 4) Adjust RT401 for -15dBs $\pm$ 0.5dB (138mVrms $\pm$ 8mVrms).				

4. ERROR MESSAGES

4.1 Error Messages in Camera Electric Volume and Digital Adjustments

<i>Error Message</i>	<i>Countermeasure</i>
ERROR OCCURRED. IRIS TROUBLE PRESS ANY KEY !	• Check whether or not power is supplied. • Check the values of the iris drive circuit. • Defective soldering, damage to pattern, etc. in the above circuit • Check the iris block and replace it if necessary.
ERROR OCCURRED ON dax ADJUSTMENT PRESS ANY KEY !	• Check the values in the hall amp circuit. • Defective soldering, damage to pattern, etc. in the above circuit.
D RANGE OVER. ERROR ON dax ADJUSTMENT PRESS ANY KEY !	• Check the values in the hall amp circuit. • Defective soldering, damage to pattern, etc. in the above circuit.
ERROR OCCURRED ERROR ON da0 and dal ADJUSTMENT PRESS ANY KEY !	• Check the values in the hall amp circuit and its peripheral circuits. • Defective soldering, damage to pattern, etc. in the above circuits.
FILE NOT FOUND !!!! PRESS ANY KEY !	• The adjustment programme (file) cannot be found. • Check the adjustment floppy disk and replace it if necessary.
FILE OPEN ERROR !!!! PRESS ANY KEY	• The adjustment programme (file) does not start. • Check the adjustment floppy disk and replace it if necessary.
ERROR OCCURRED ON C DUTY ADJUSTMENT PRESS ANY KEY	• Check the values of the iris drive circuit. • Defective soldering, damage to pattern, etc. in the above circuit.
ERROR OCCURRED ON FDET ADJUSTMENT PRESS ANY KEY !	• Supply power again and re-adjust. • Check the values in the hall amp circuit. • Defective soldering, damage to pattern, etc. in the above circuit.
ERROR OCCURRED ZOOM DOES NOT WORK PRESS ANY KEY	• Supply power again and re-adjust.
TOO BRIGHT PRESS ANY KEY !	• The subject is too bright. • Move the camera further away from the light box.
TOO DARK PRESS ANY KEY !	• The subject is too dark. • Check the light box. • Move the camera closer to the light box.
D RANGE OVER ERROR ON HALL AMP IRIS CANNOT OPEN ANY MORE PRESS ANY KEY !	• Supply power again and re-adjust. • The subject is too dark. • Check the light box. • Move the camera closer to the light box. • Check the values in the hall amp circuit. • Defective soldering, damage to pattern, etc. in the above circuit.

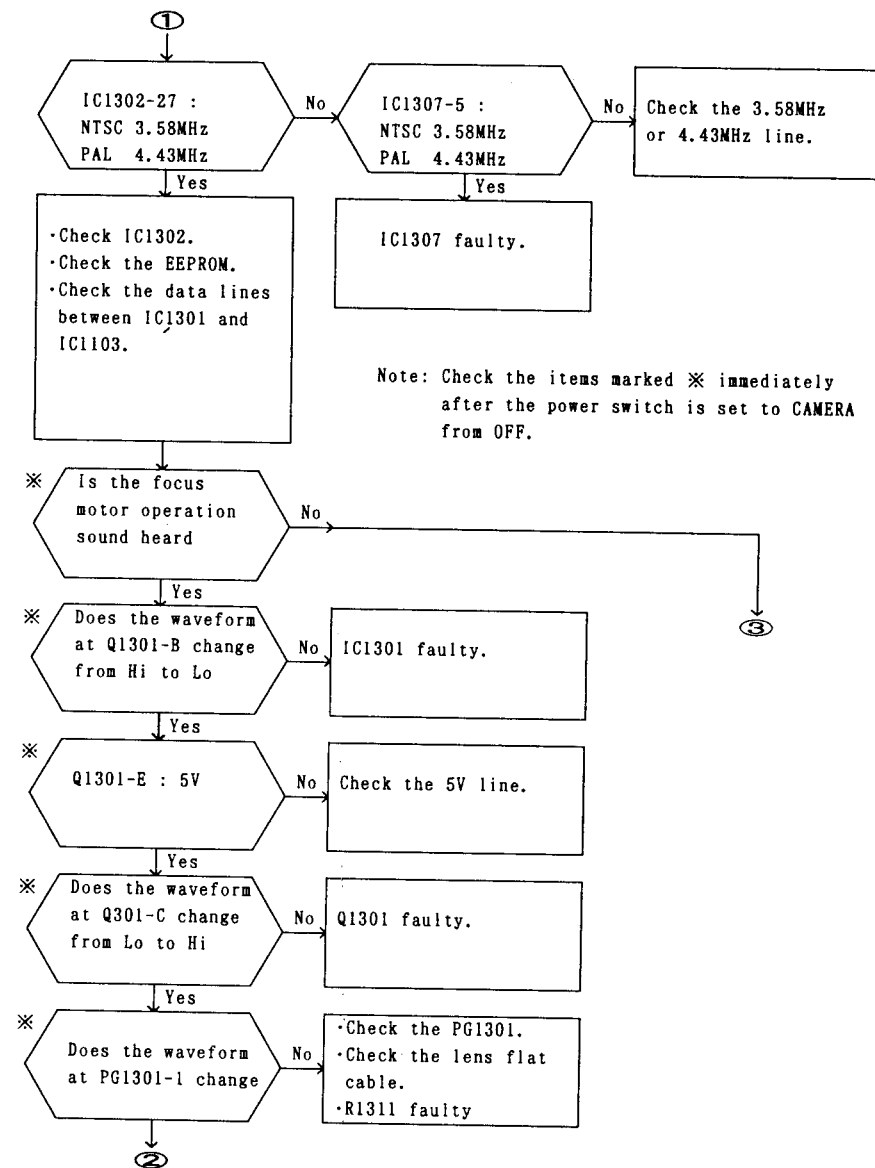
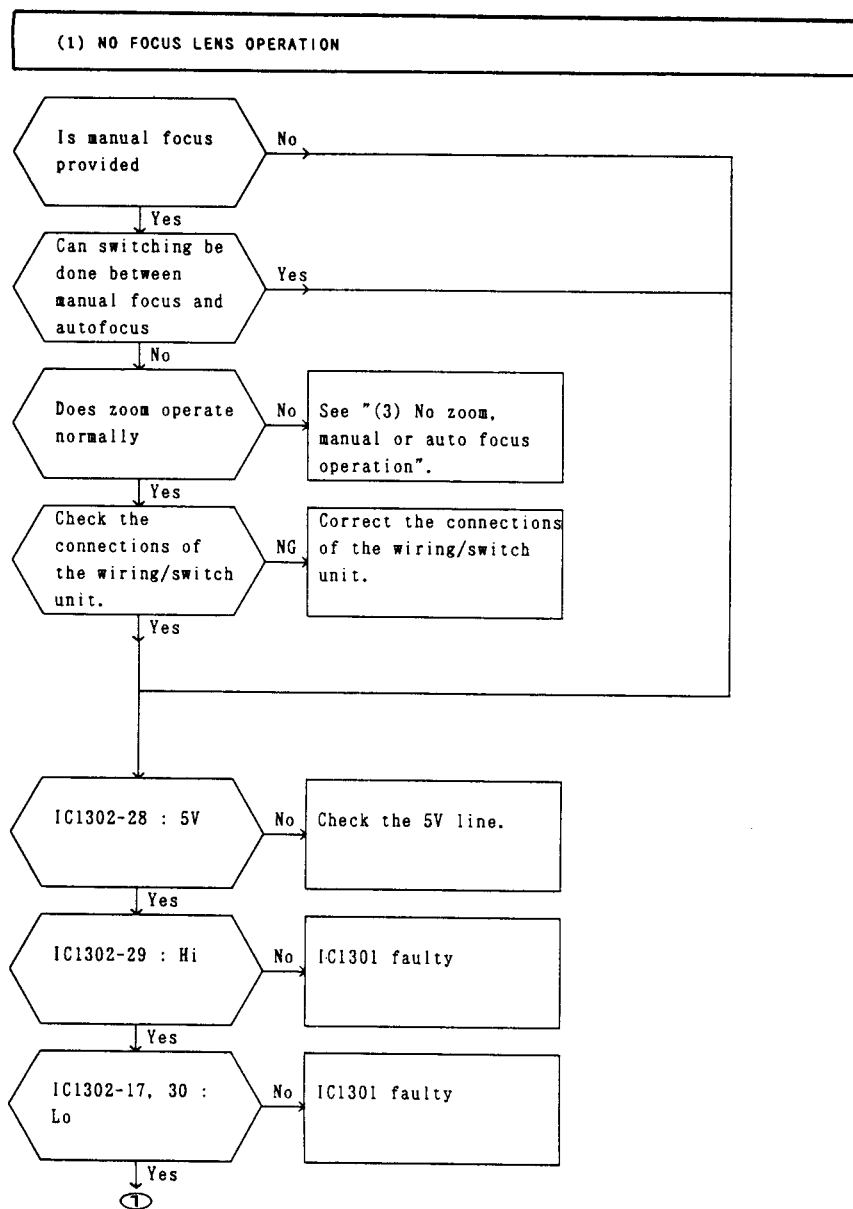
<i>Error Message</i>	<i>Countermeasure</i>
STAURATION ERROR. TOO BRIGHT PRESS ANY KEY !	• The subject is too bright. • Move the camera further away from the light box.
CAN' T ADJUSTMENT WHITE BALANCE PLEASES RETRY PRESS ANY KEY	• The subject is too bright or too dark. • Check the light box. • Move the camera closer to or away from the light box. • Supply power again and re-adjust.

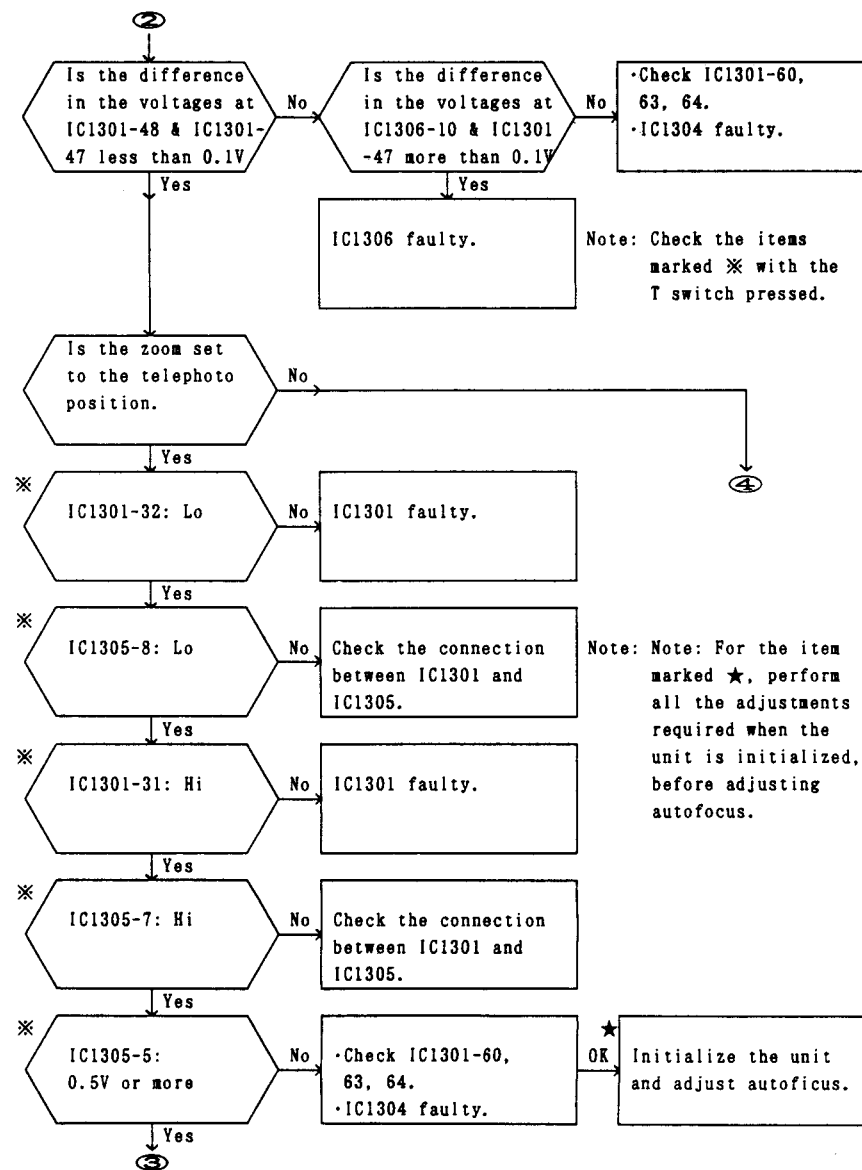
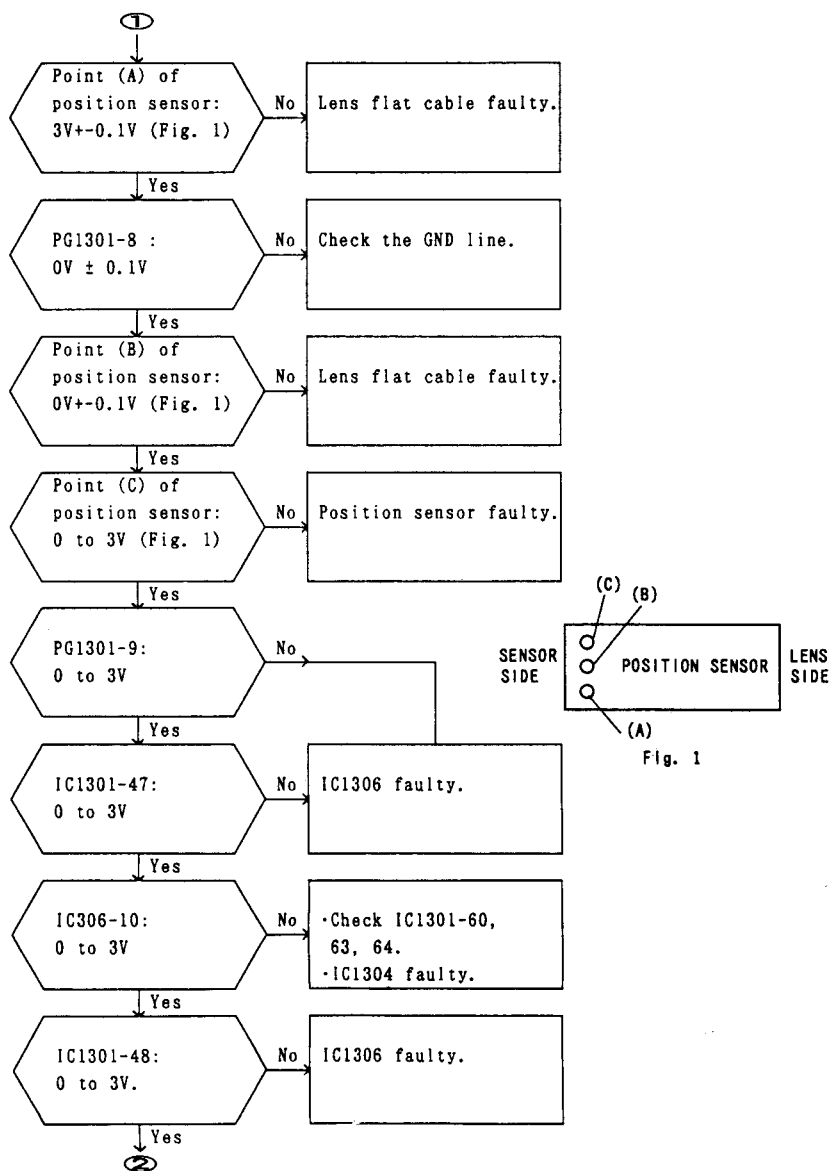
4.2 Error Messages in Autofocus and Electronic Stabilizer Adjustments

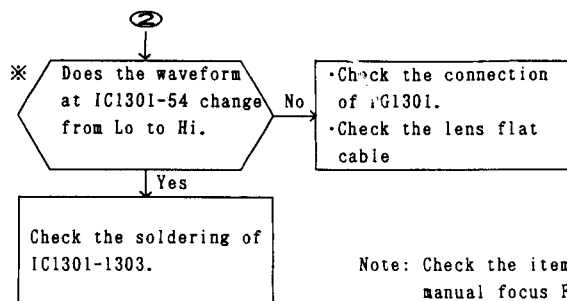
<i>Error Message</i>	<i>Countermeasure</i>
DATA INITIALIZE ERROR	• Error in communications between the DSP uP and autofocus uP. • Check the connections between the DSP uP and autofocus uP.
Error : AFA SETUP File nothing	• The autofocus adjustment programme cannot be found. • Check the adjustment floppy disk and replace it if necessary.
TIME OUT ERROR ON AF STEP	• If this error message appears even when the adjustment is performed 2 or 3 times, the autofocus circuit system is defective. • Refer to (1) of TROUBLESHOOTING OF AUTOFOCUS.
TIME OUT ERROR ON ZOOM	• If this error message appears even when the adjustment is performed 2 or 3 times, the autofocus circuit system is defective. • Refer to (2) of TROUBLESHOOTING OF AUTOFOCUS.
CAN' T COMPLET AF ADJUSTMENT	• If this error message appears even when the adjustment is performed 2 or 3 times, the autofocus circuit system is defective. • Refer to (2) of TROUBLESHOOTING OF AUTOFOCUS.
TIME OUT ERROR ON AF ADJUSTMENT	• If this error message appears even when the adjustment is performed 2 or 3 times, the autofocus circuit system is defective. • Refer to (2) of TROUBLESHOOTING OF AUTOFOCUS.
AF LIMIT OVER	• If this error message appears even when the adjustment is performed 2 or 3 times, the autofocus circuit system is defective. • Refer to (2) of TROUBLESHOOTING OF AUTOFOCUS.
OUT OF RENGE	• Error in communications between the DSP uP and autofocus uP. • Check the connections between the DSP uP and autofocus uP. • The electronic variable resistor adjustment or digital adjustment is incorrect.
CANNOT OPEN THE FILE PRESS ANY KEY	• The EIS adjustment programme does not start. • Check the adjustment floppy disk and replace it if necessary.

4.3 Error Messages in VTR Adjustment

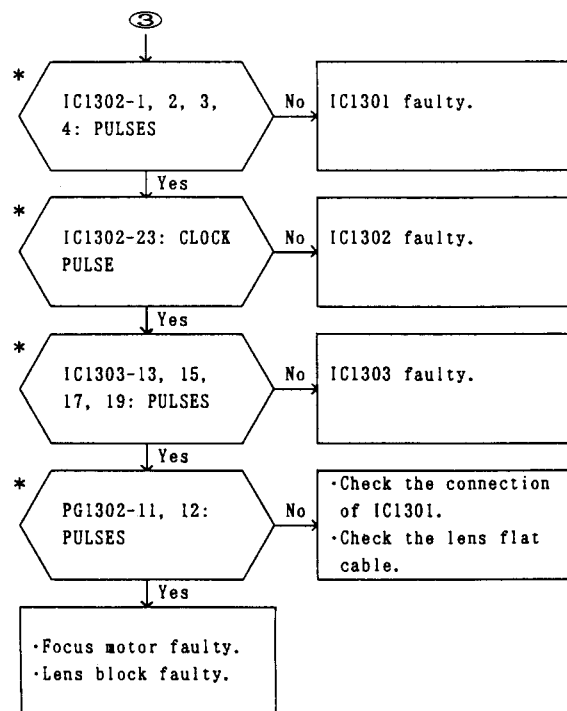
<i>Error Message</i>	<i>Countermeasure</i>
Error : SWP_TEST.DAT file nothing !	• The adjustment programme cannot be found. • Check the adjustment floppy disk and replace it if necessary.
ERROR : INVALID MODEL PRESS ANY KEY	• A wrong model has been selected. • The adjustment programme cannot be found. • Check the adjustment floppy disk and replace it if necessary.
THIS MODEL IS NOT NEED THE ADJUSTMENT PRESS ANY KEY	• A wrong model has been selected. • A product that needs analog adjustment is connected.
ADJUSTMENT INCOMPLETED PRESS ANY KEY	• The value set by adjustment defective. • Re-adjust. • Check cylinder. • Check the alignment tape. • Check whether or not the usual operation is done correctly
RETRY ADJUSTING. PRESS ANY KEY	• Supply power again and re-adjust.
CAMERA IS NOT READY	• Check whether or not power is supplied.
ERRER OCCURRED CAN'T PLAY BACK PRESS ANY KEY	• Not playback video. • Refer to (1) of TROUBLESHOOTING OF VTR.
ERROR OCCURRED NO V.SYNC FOURD	• Vertical sync loss. • Refer to (2) of TROUBLESHOOTING OF VTR.
INVALID MODEL PRESS ANY KEY	• A wrong model has been selected. • The adjustment programme cannot be found. • Check the adjustment floppy disk and replace it if necessary.
ERROR OCCURRED CAN'T RECORD PRESS ANY KEY	• No video recording. • Refer to (3) of TROUBLESHOOTING OF VTR.



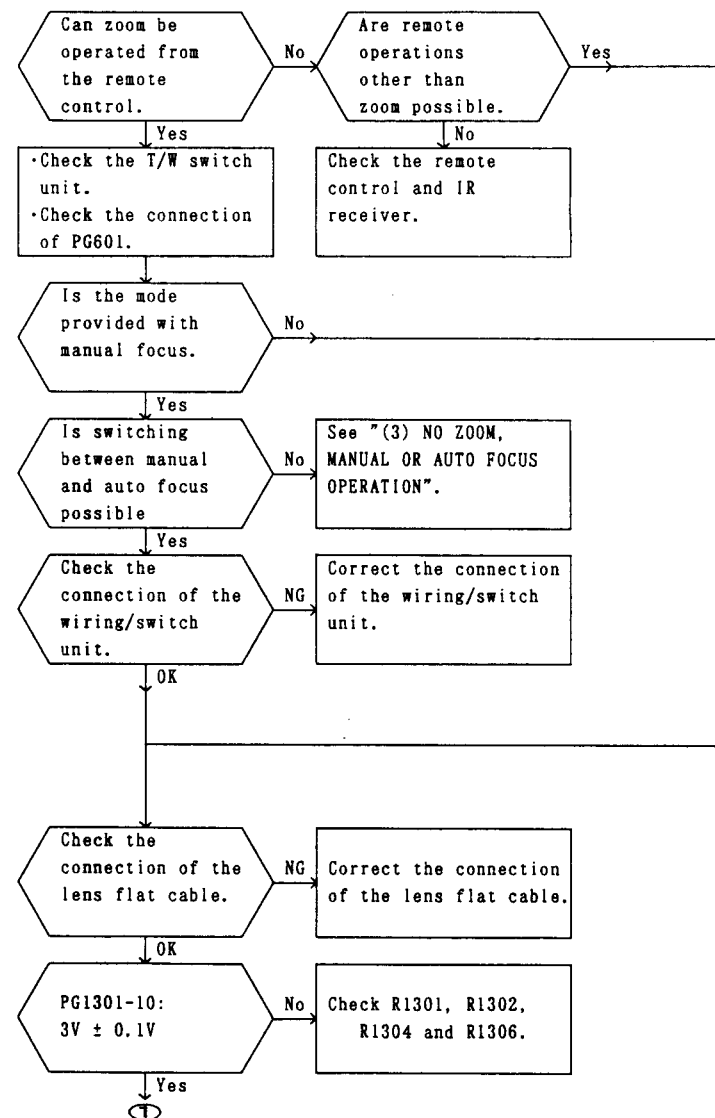


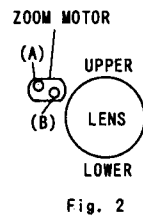
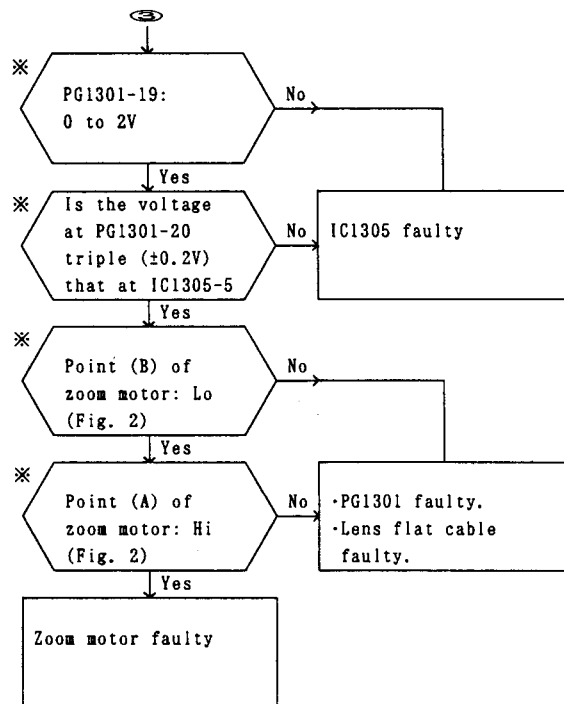


Note: Check the items marked * by pressing the manual focus FAR and NEAR switches alternately. (With a camera/recorder which does not have the manual focus function, point at the subjects at approx. 1 m and 3 m away alternately.)

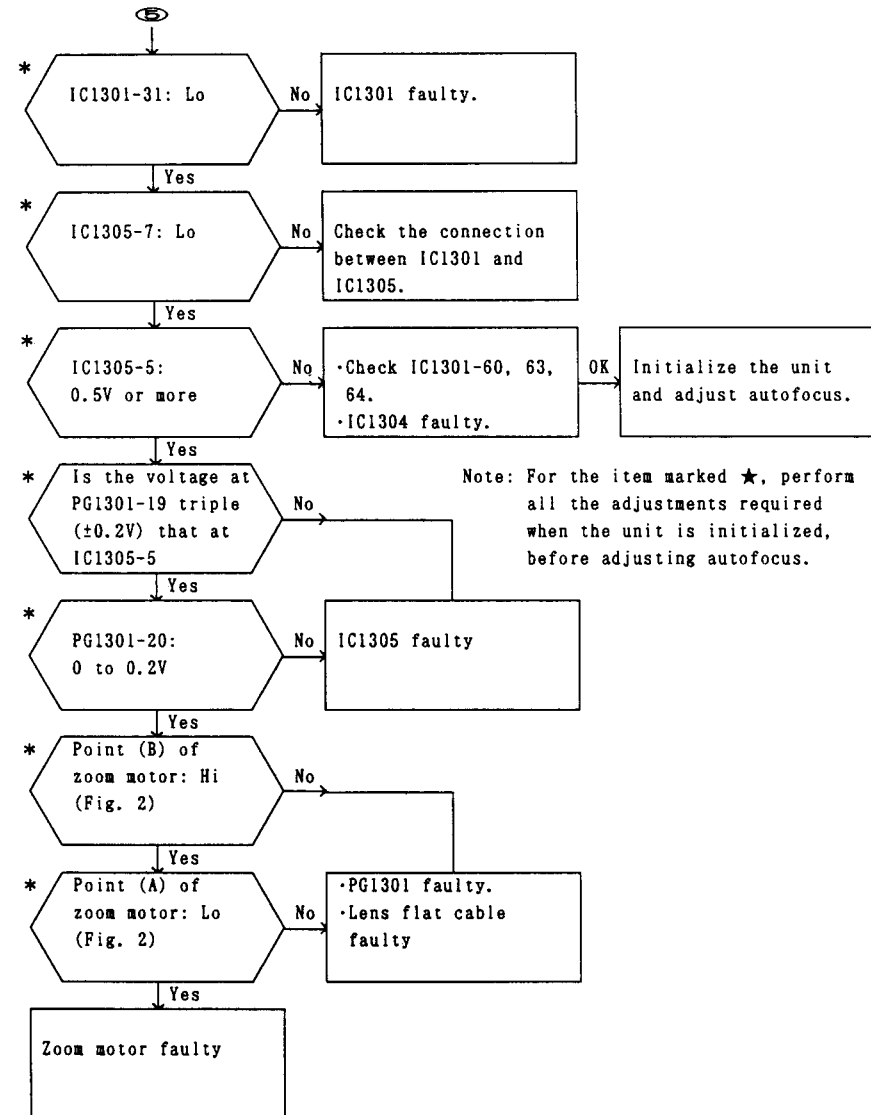
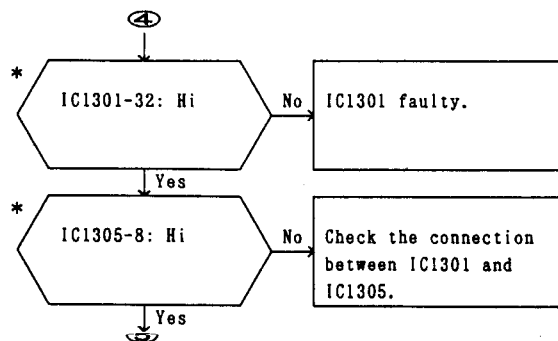


(2) NO ZOOM OPERATION

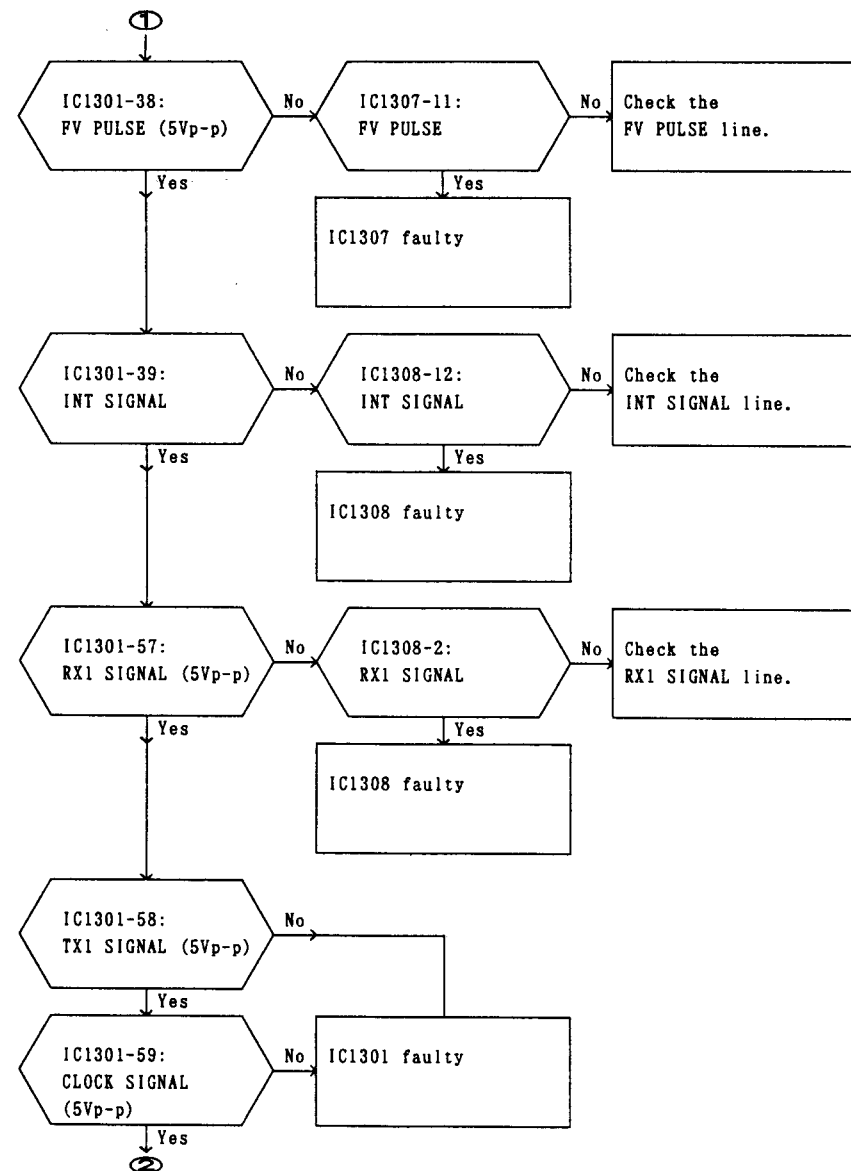
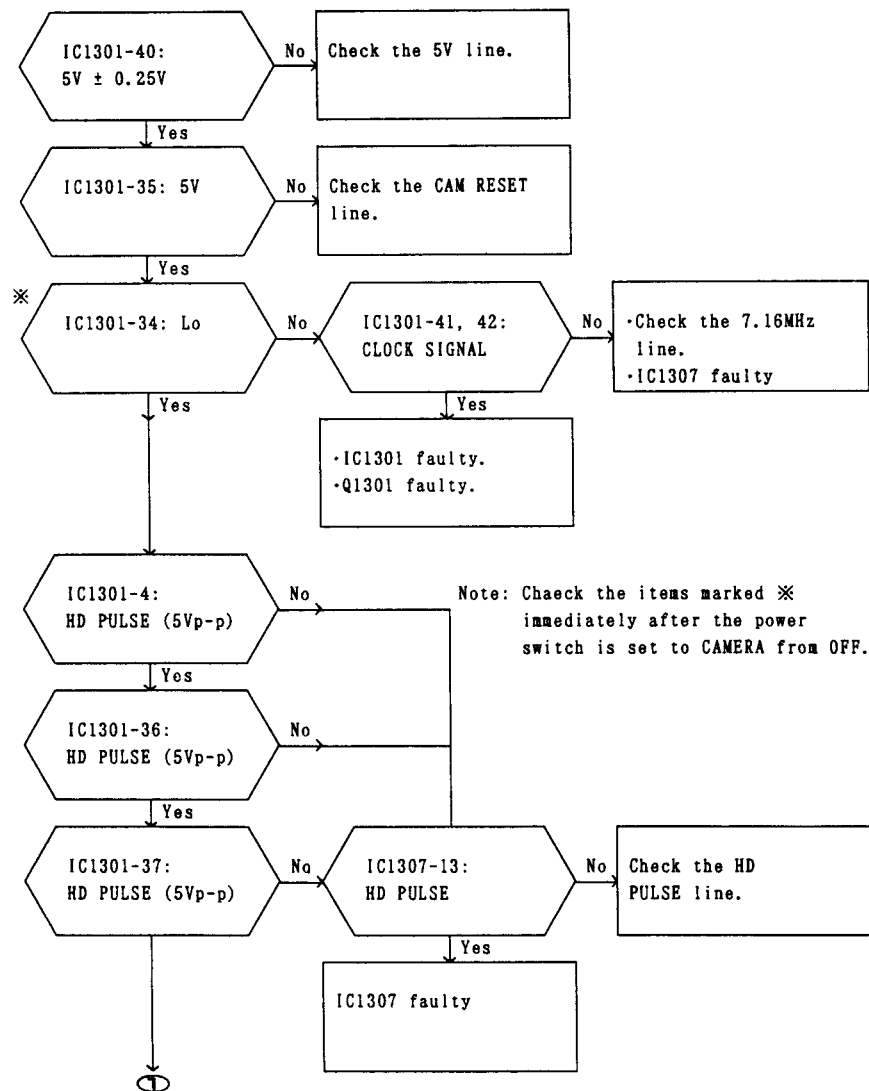


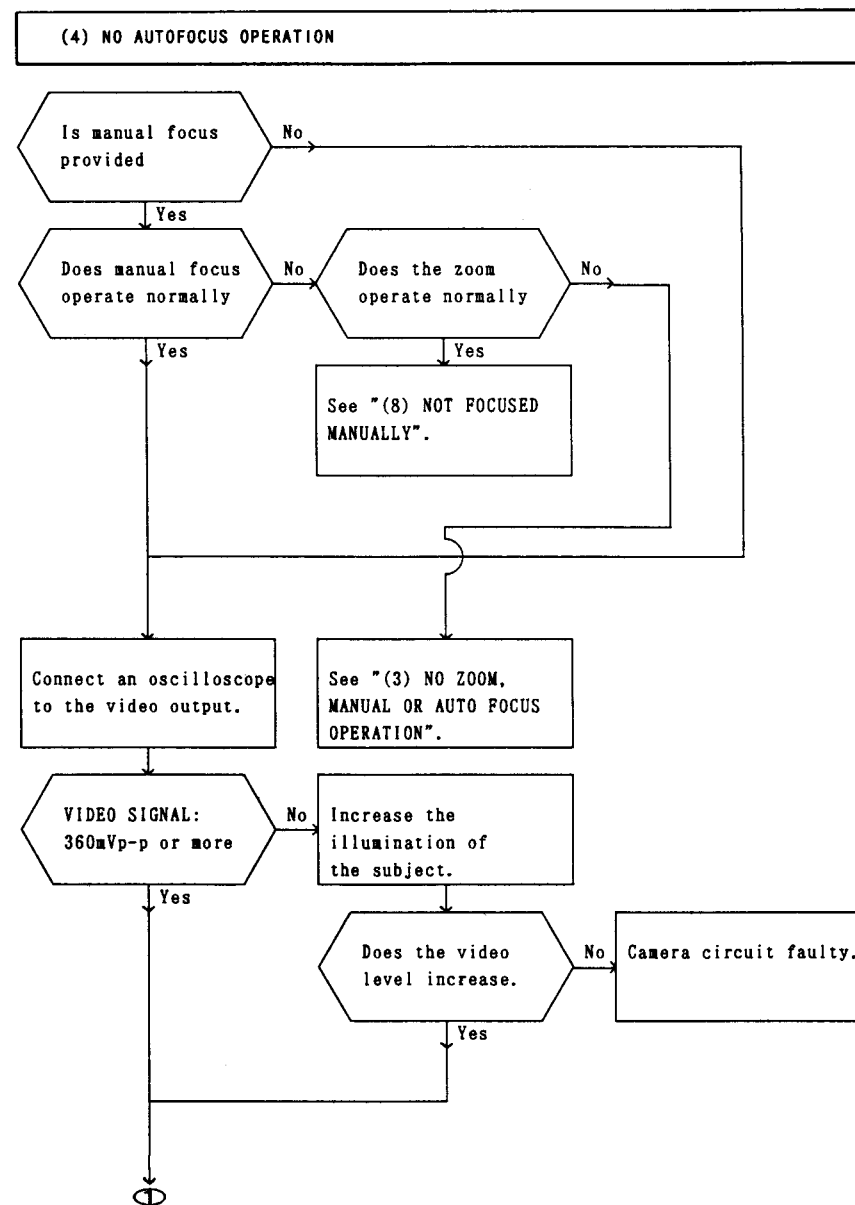
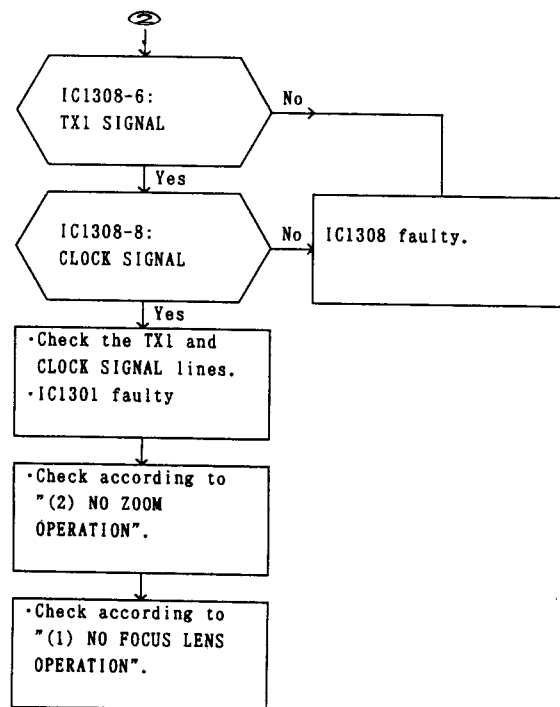


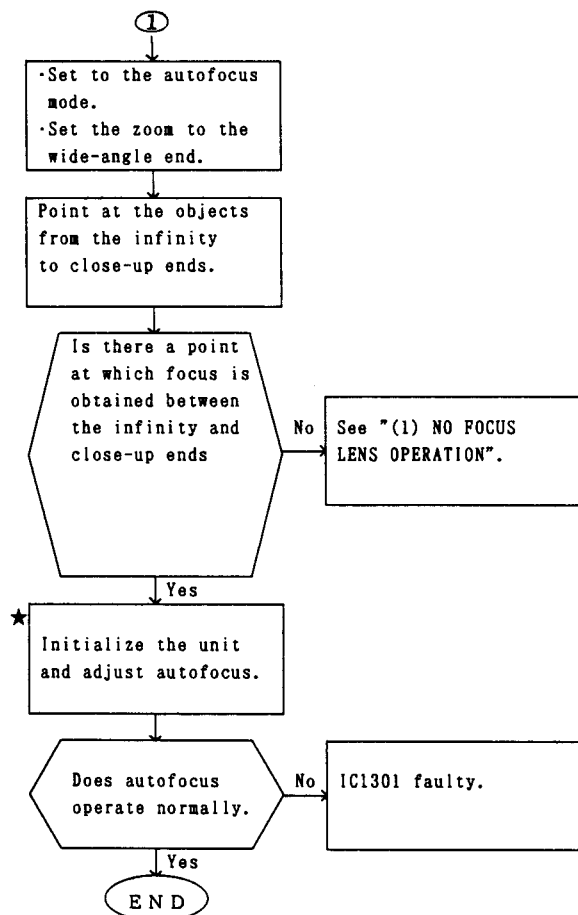
Note: Check the items marked * with the T switch pressed.



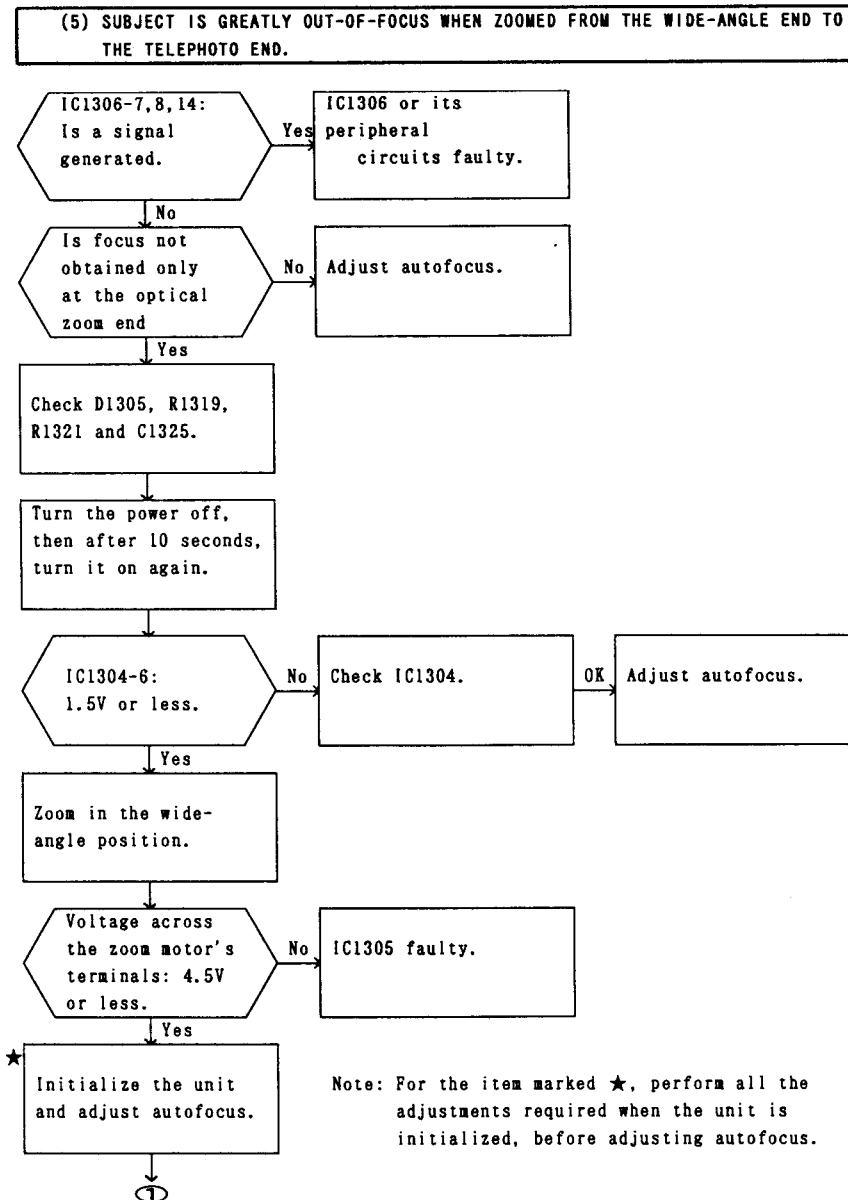
(3) NO ZOOM, MANUAL OR AUTO FOCUS OPERATION



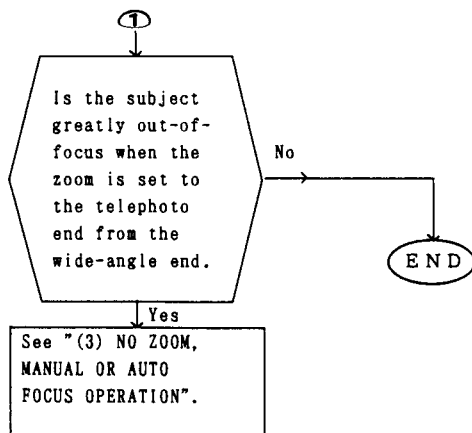




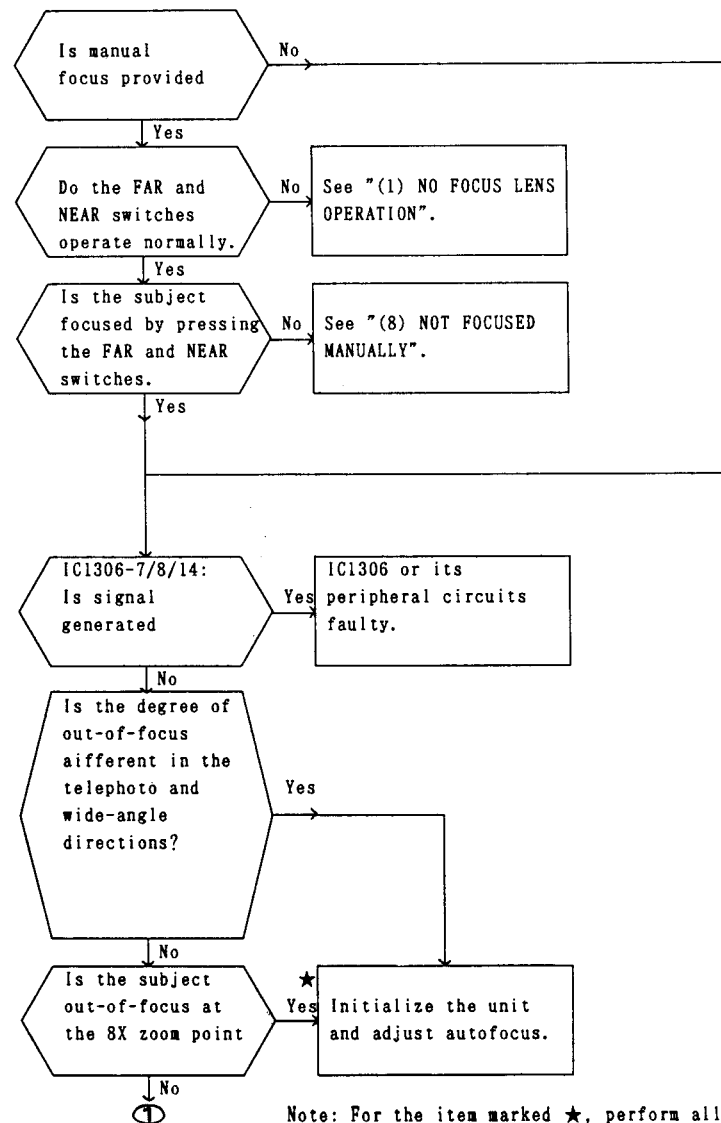
Note: For the item marked *, perform all the adjustments required when the unit is initialized, before adjusting autofocus.



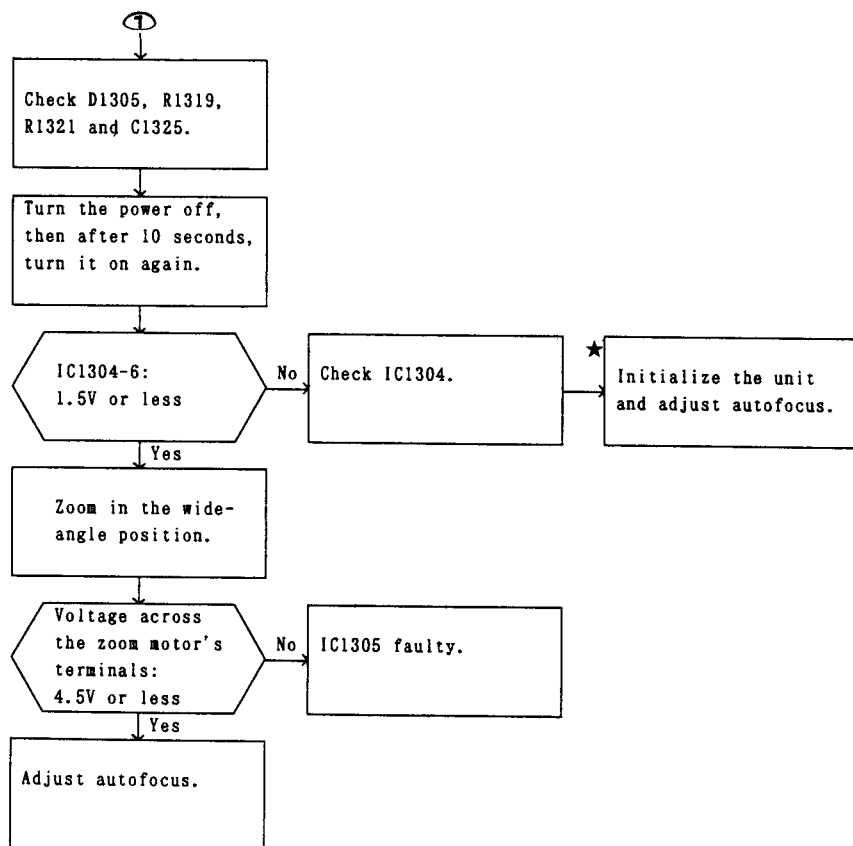
Note: For the item marked ★, perform all the adjustments required when the unit is initialized, before adjusting autofocus.



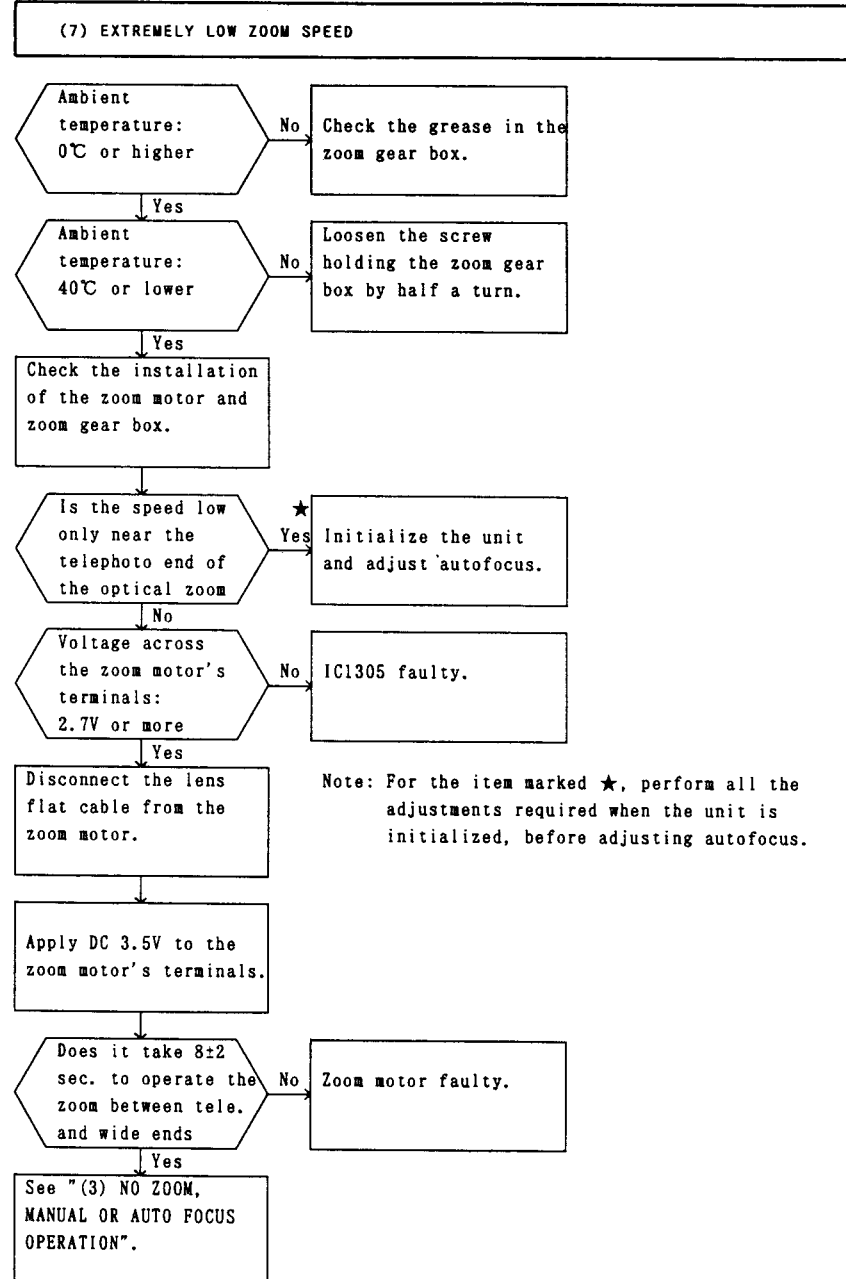
(6) SUBJECT IS GREATLY OUT-OF-FOCUS WHEN ZOOMED FROM THE TELEPHOTO END TO THE WIDE-ANGLE END.



Note: For the item marked ★, perform all the adjustments required when the unit is initialized, before adjusting autofocus.



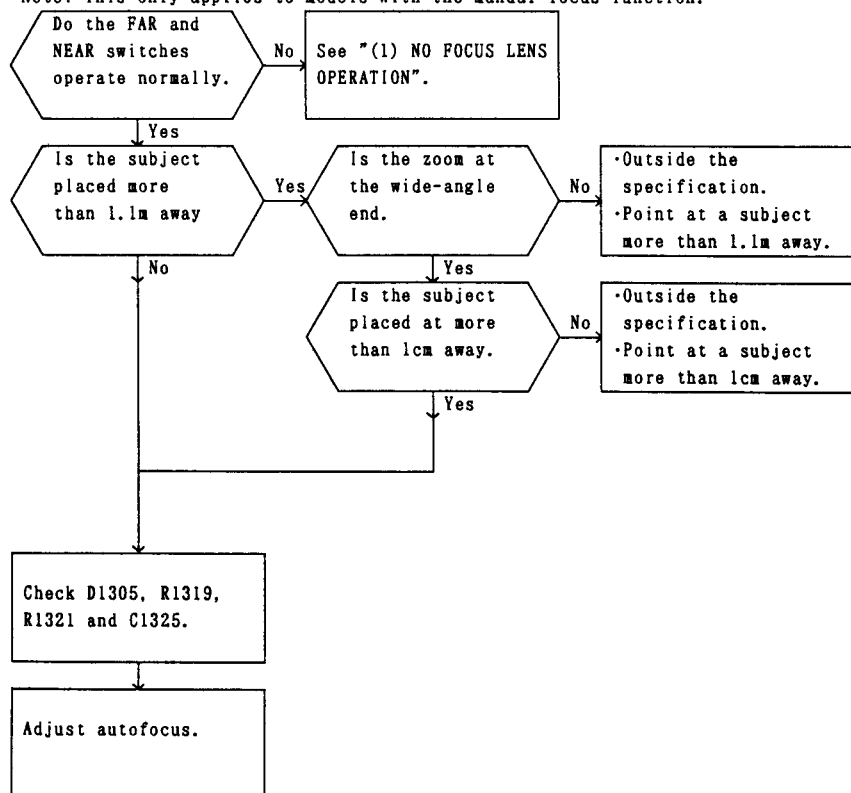
Note: For the item marked ★, perform all the adjustments required when the unit is initialized, before adjusting autofocus.



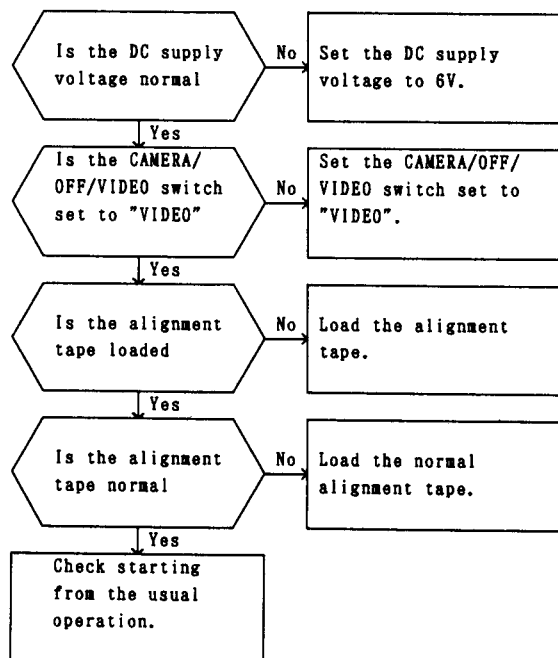
Note: For the item marked ★, perform all the adjustments required when the unit is initialized, before adjusting autofocus.

(8) NOT FOCUSED MANUALLY

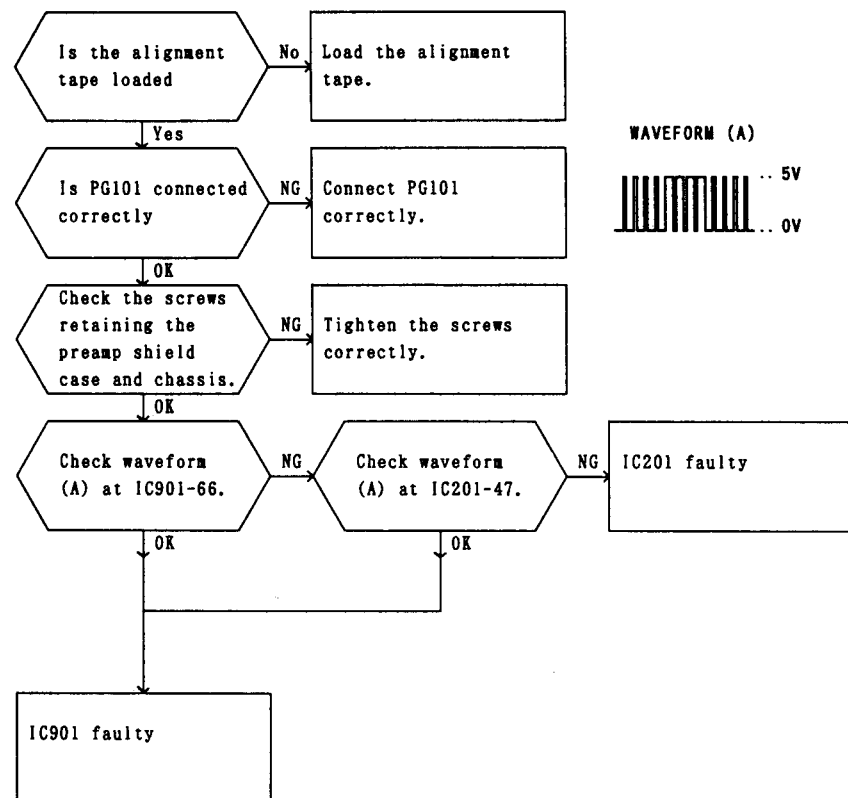
Note: This only applies to models with the manual focus function.



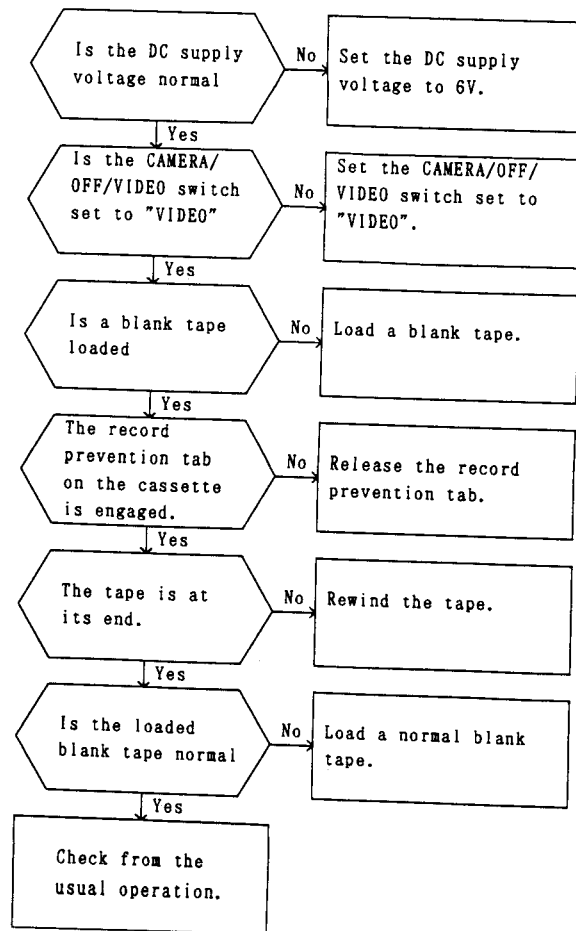
(1) NO PLAYBACK VIDEO



(2) VERTICAL SYNC LOSS



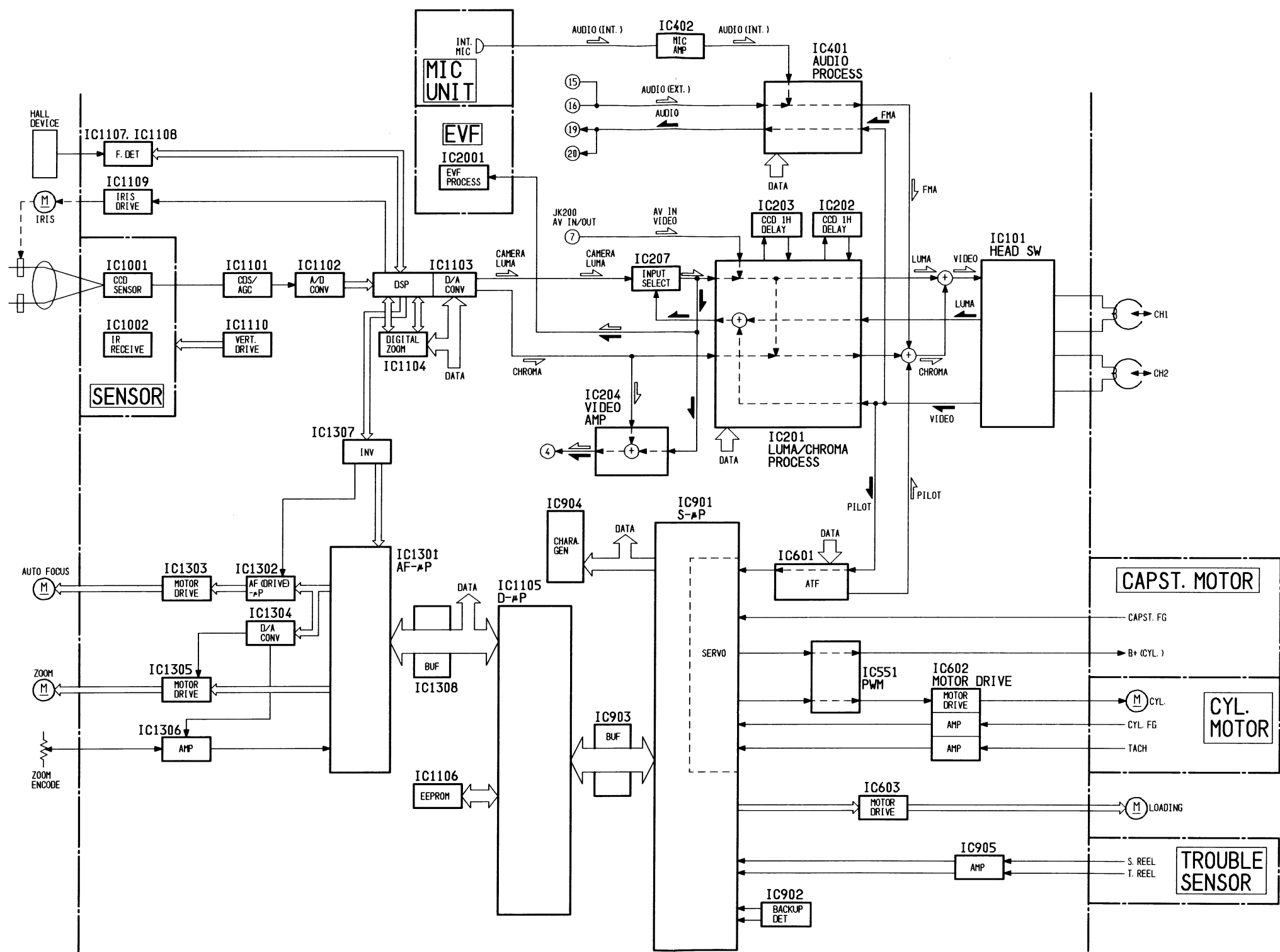
(3) NO VIDEO RECORDING



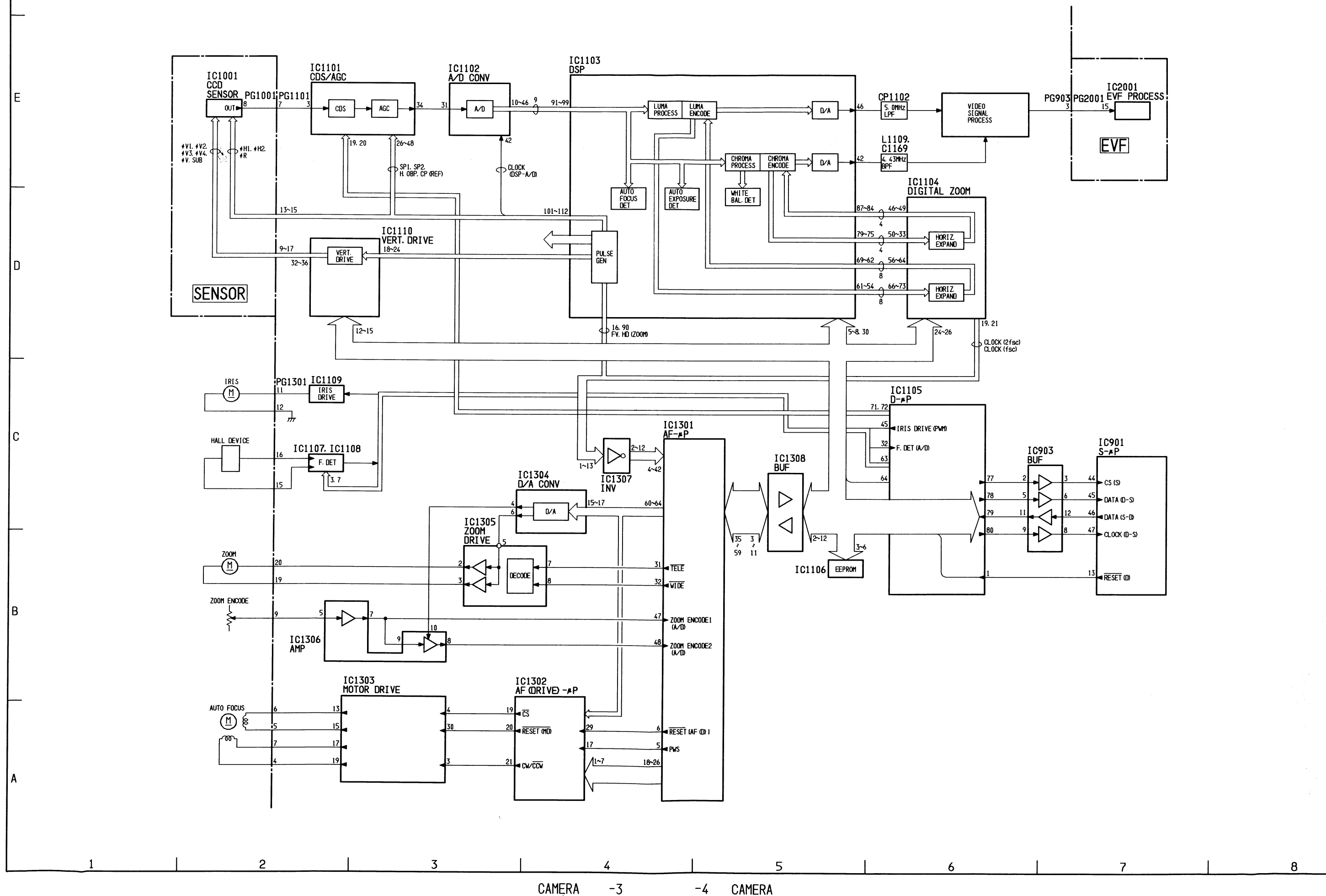
M820

BLOCK DIAGRAMS & SCHEMATIC DIAGRAMS

BLOCK DIAGRAMS
1. OVERALL



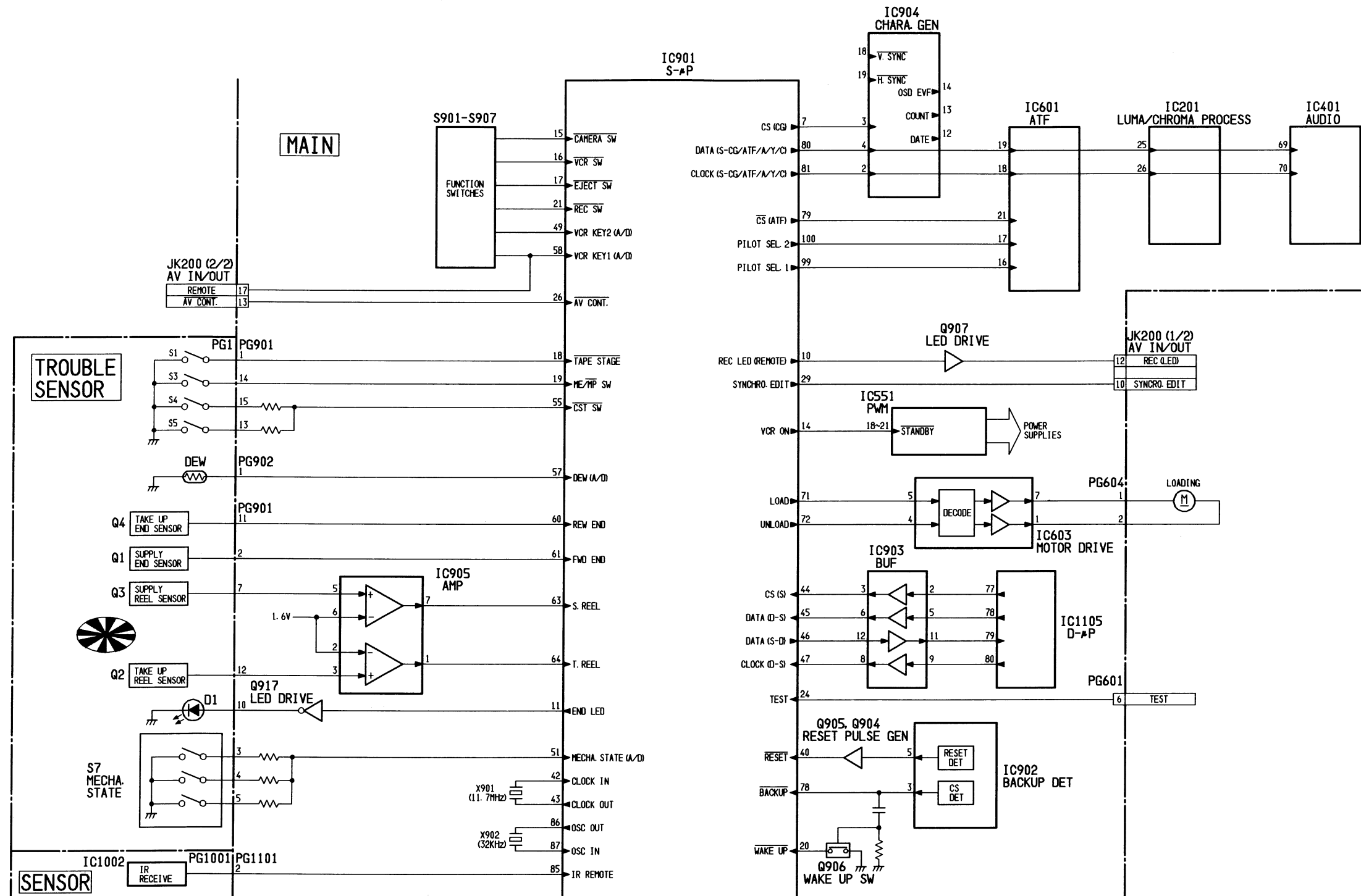
2. CAMERA



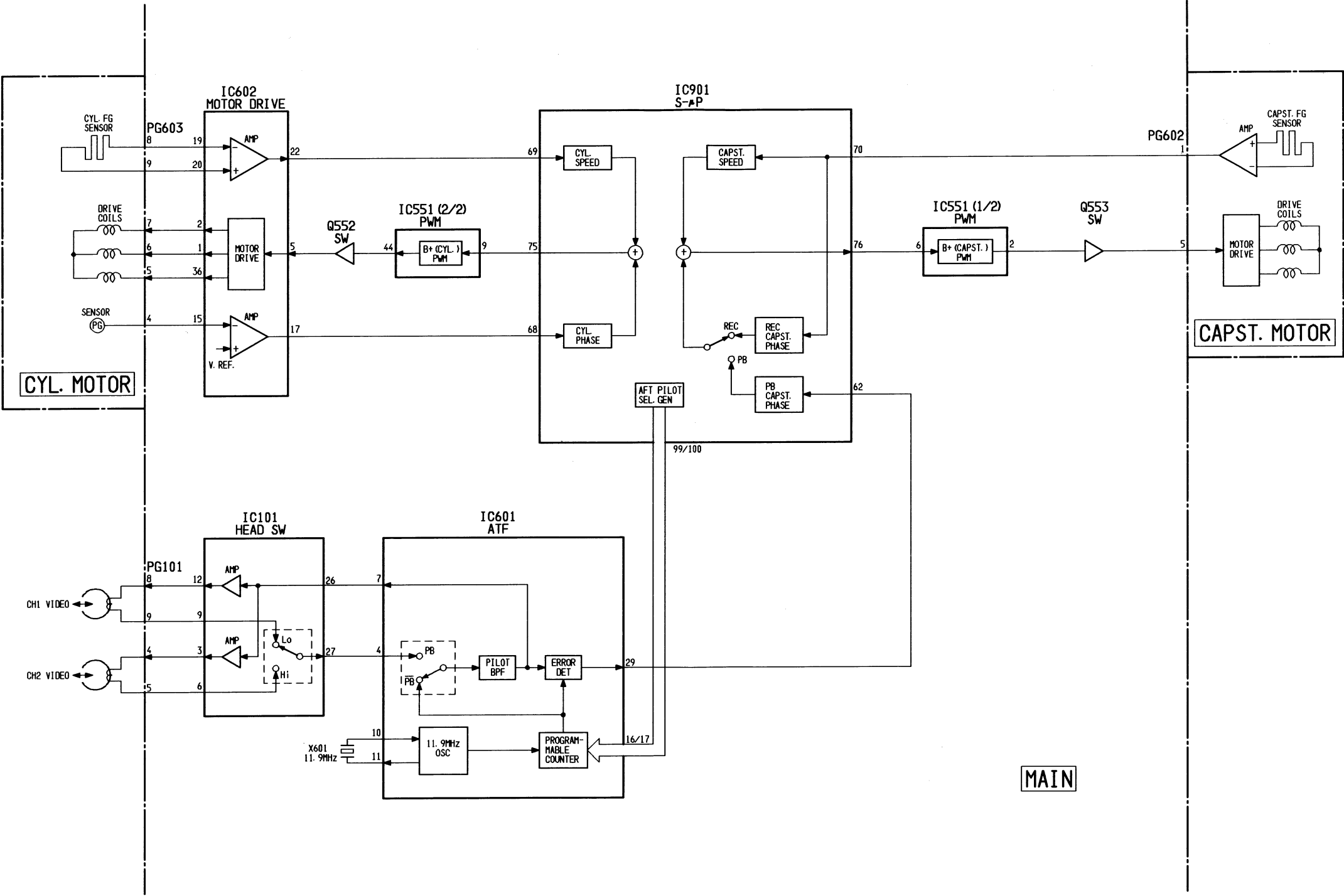
A horizontal number line with tick marks labeled 1 through 8. The line is divided into segments by vertical tick marks. The segments are labeled 1, 2, 3, 4, 5, 6, 7, and 8 from left to right.



4. SYSTEM CONTROL



5. SERVO



A vertical scale with five horizontal tick marks. The marks are labeled A, B, C, D, and E from bottom to top.



SCHEMATIC & CIRCUIT BOARD DIAGRAMS

[Parts Location Indexing Tables]

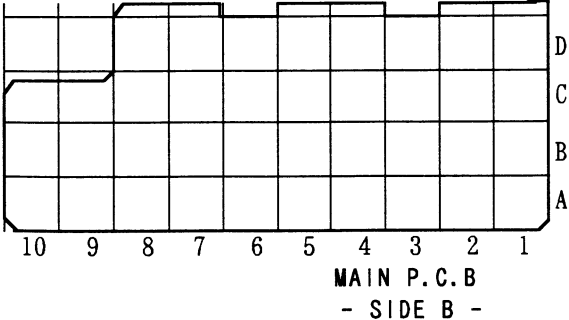
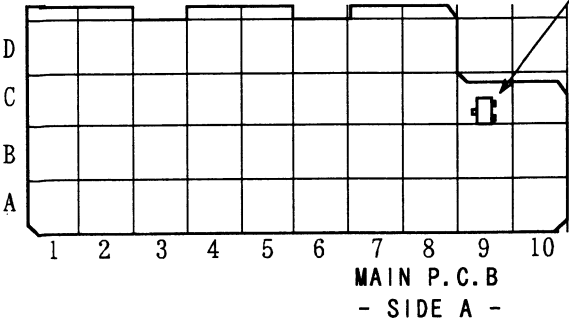
This service manual shows the parts location indexing tables beside the major circuit board diagrams. These tables indicate the locations of each part on the circuit boards. Use the tables to locate the parts on the circuit boards.

IDENTIFICATION OF PARTS LOCATION

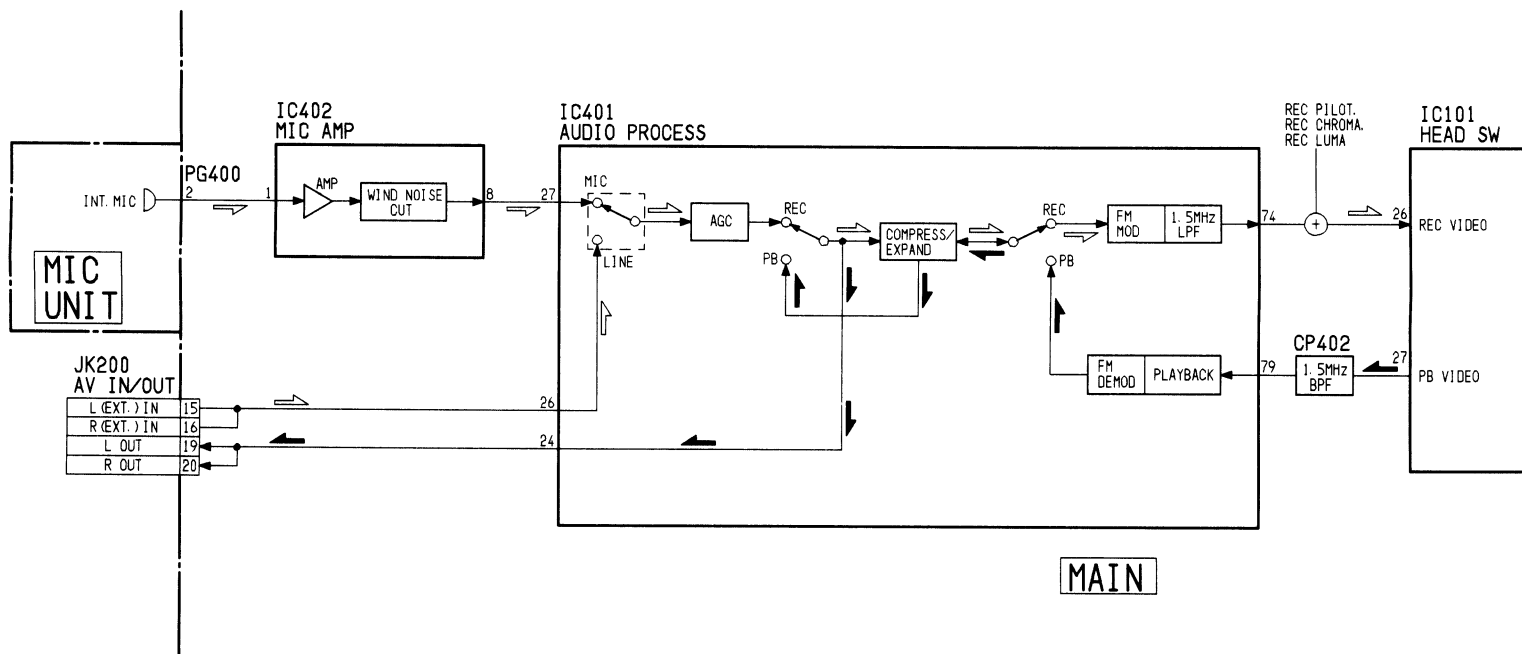
Symbol N o .	Parts Location
C201	A-2B
C202	B-3B
C203	A-4A

Symbol N o .	Parts Location
R201	B-5C
R202	A-5B
Q216	A-9C

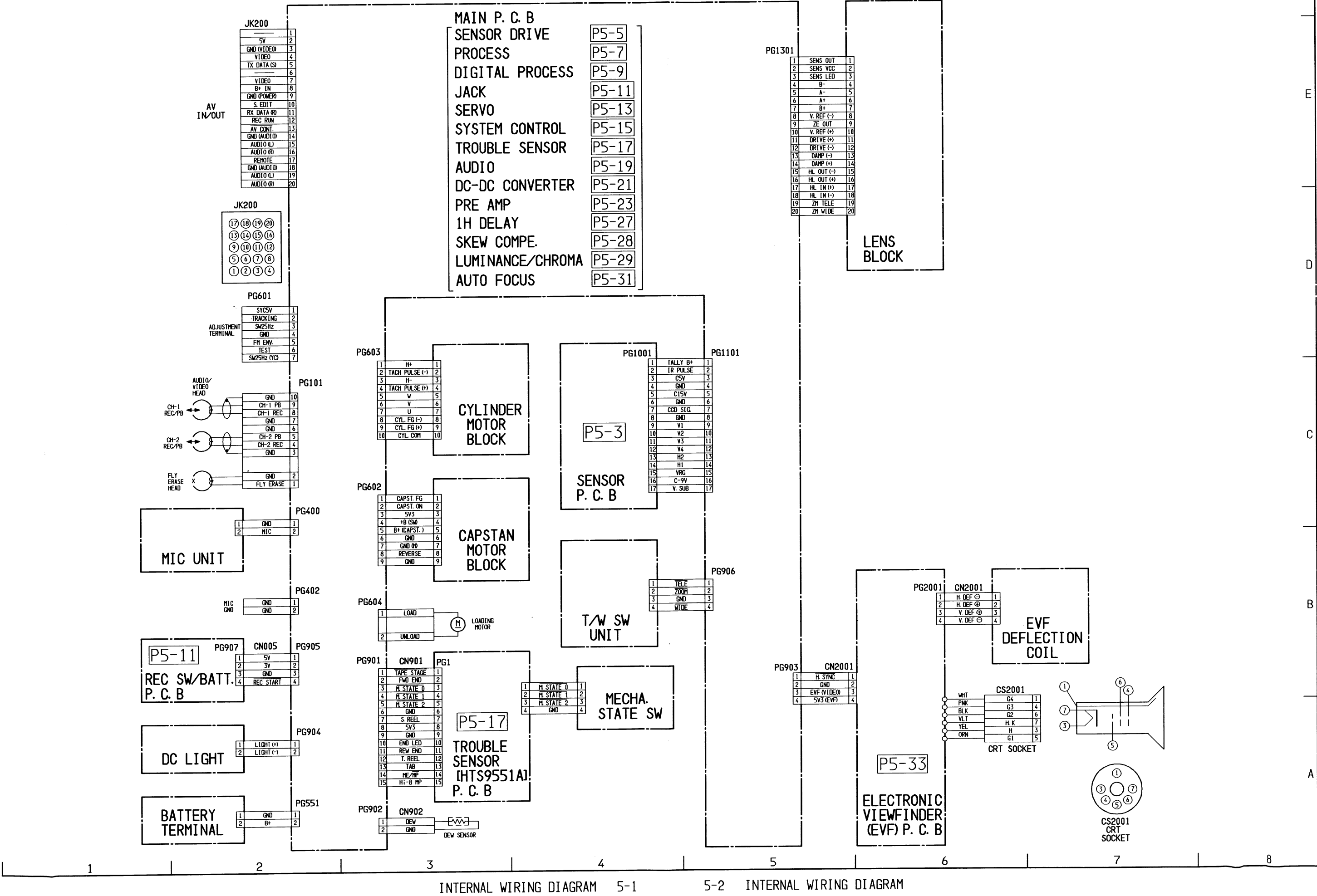
A-9C
Location
Face of board



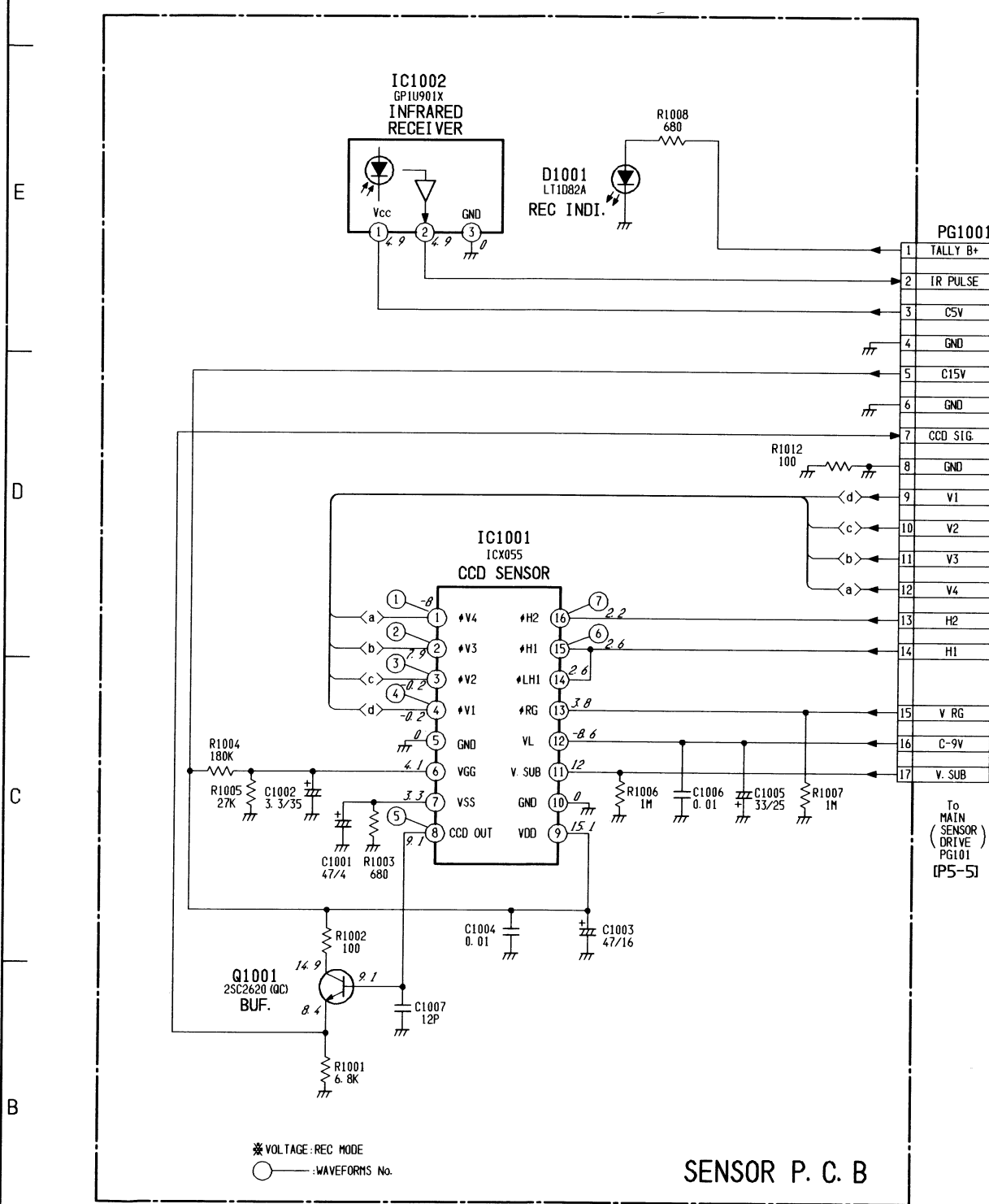
7. AUDIO



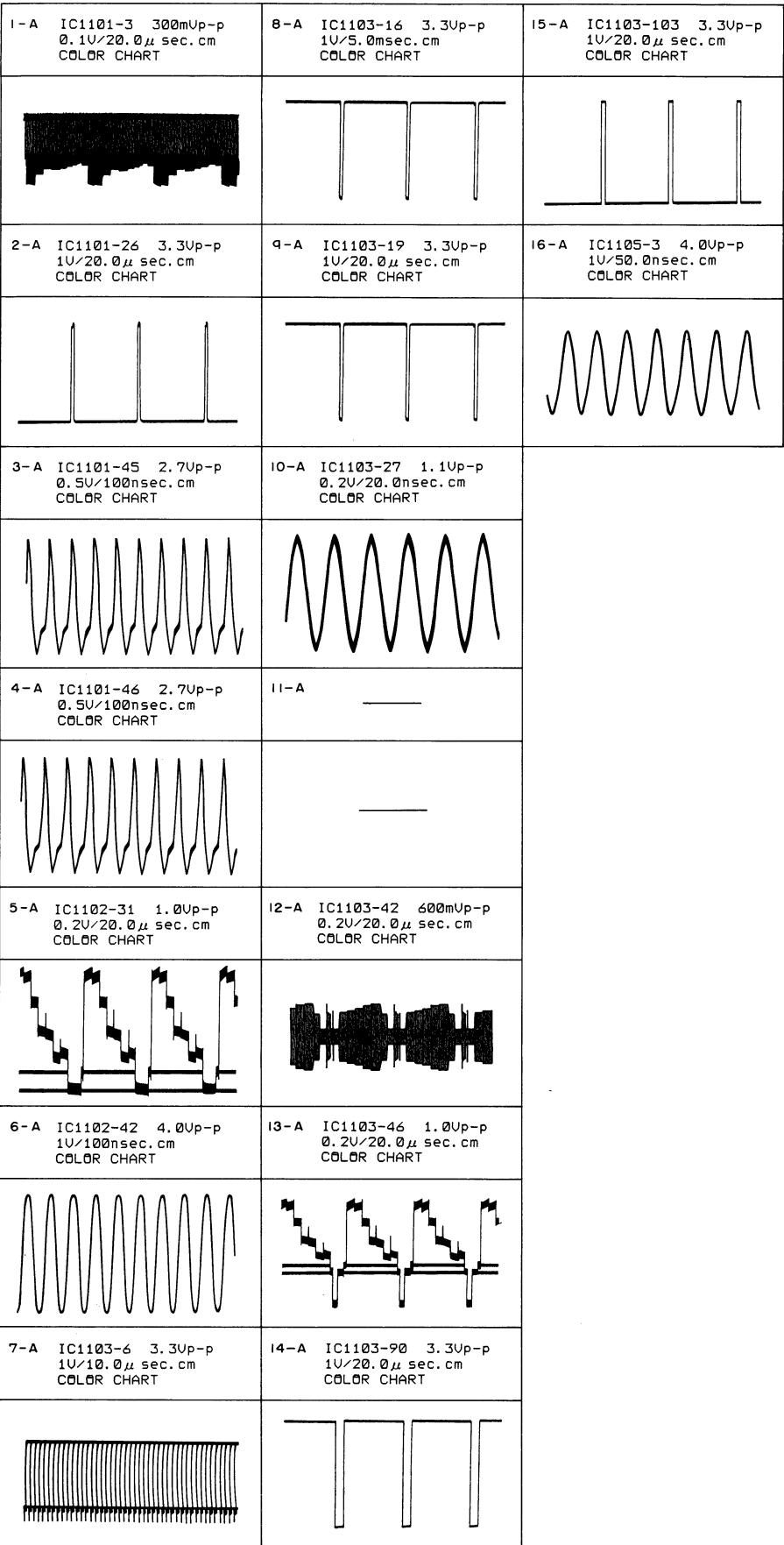
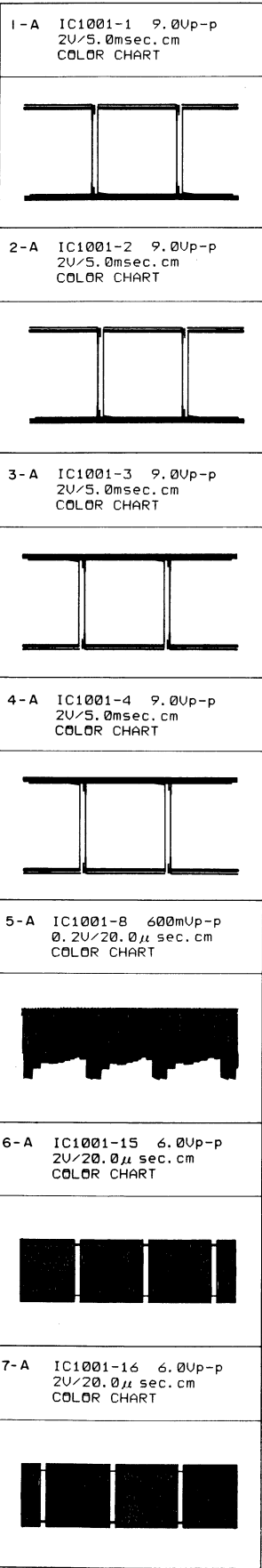
INTERNAL WIRING DIAGRAM



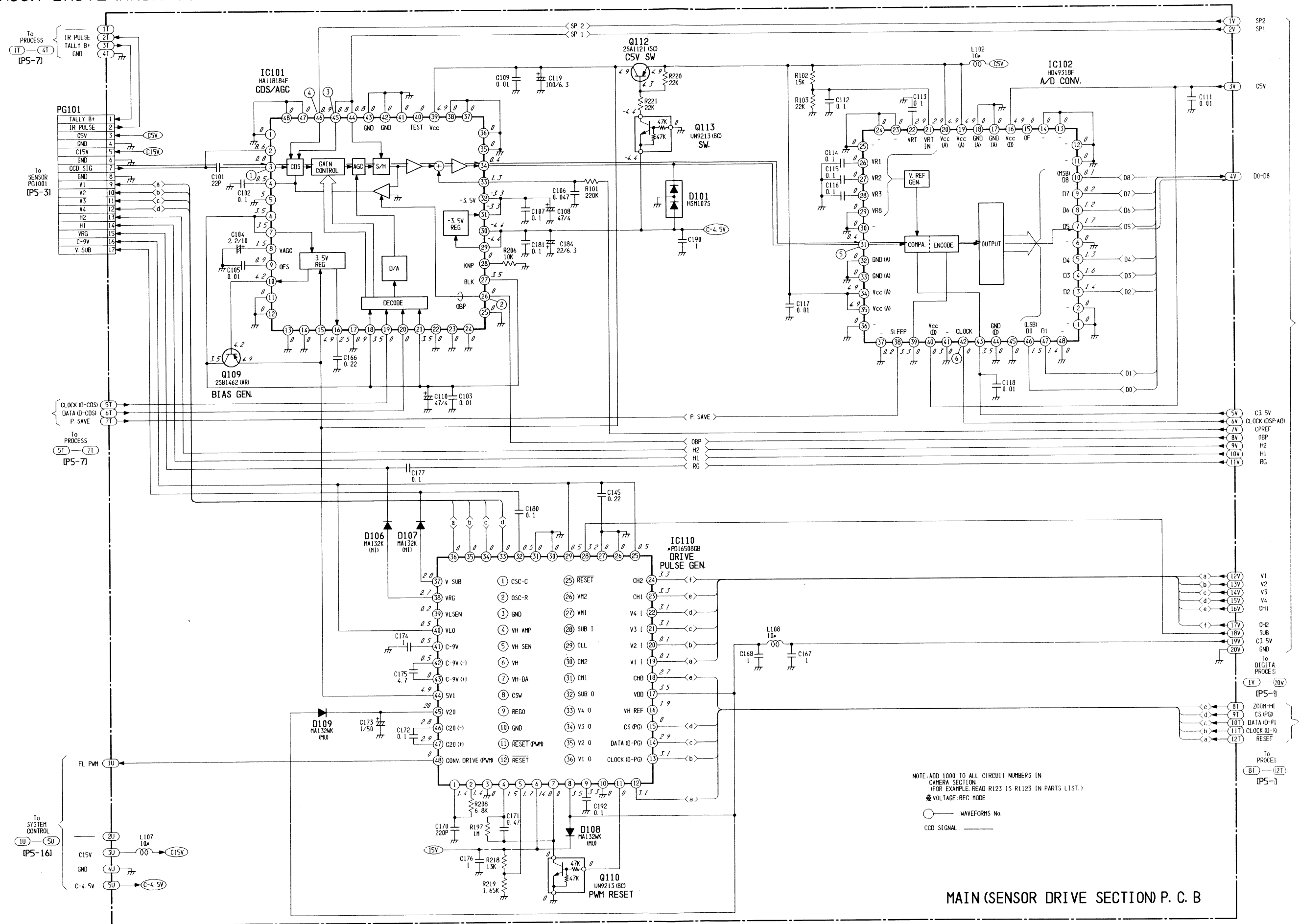
SENSOR SCHEMATIC DIAGRAM



SENSOR/PROCESS WAVEFORMS



SENSOR DRIVE (MAIN) SCHEMATIC DIAGRAM



MAIN (SENSOR DRIVE SECTION) P. C. B

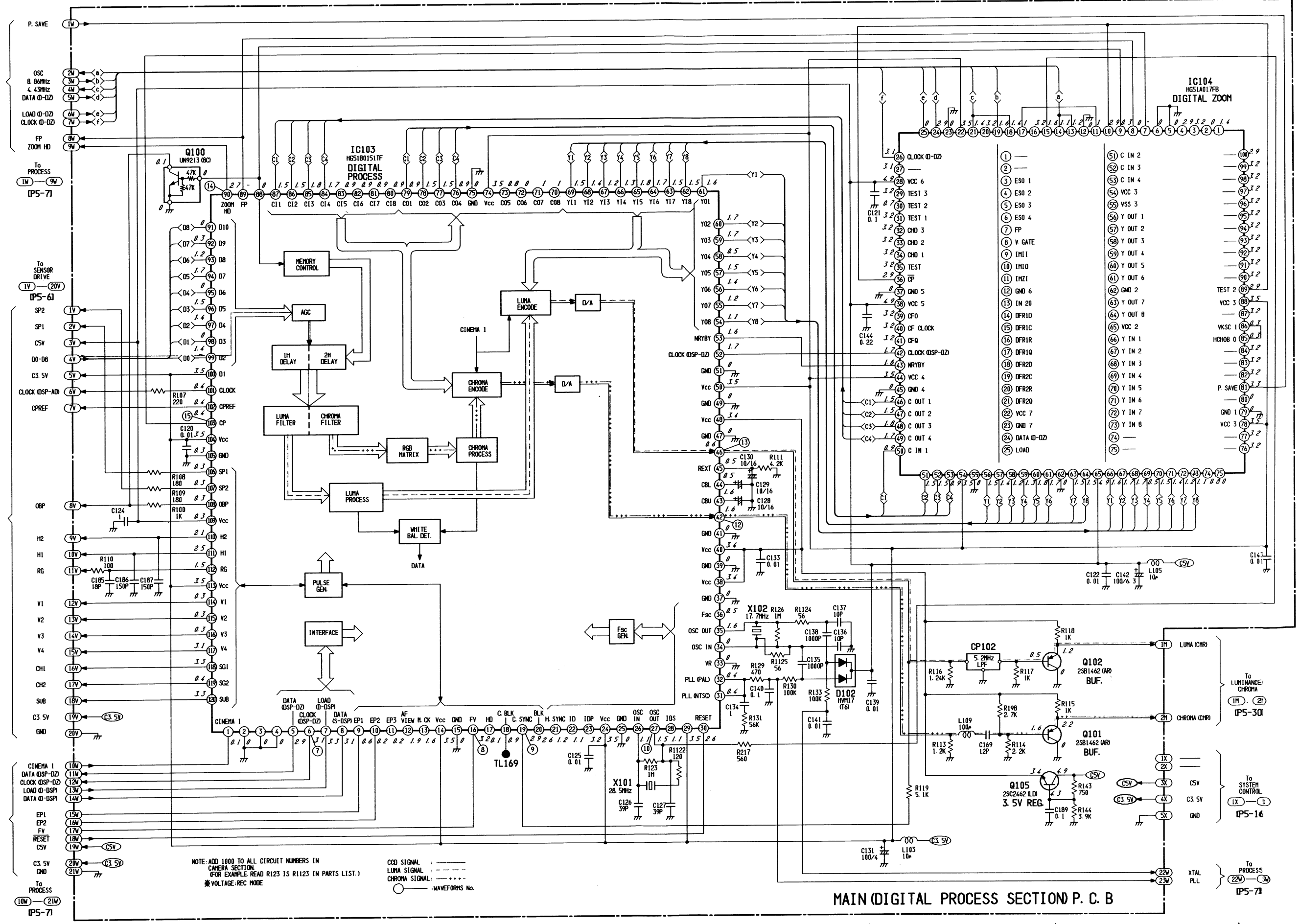
PROCESS. WIRING/SWITCH UNIT 5-7

PROCESS 5-8

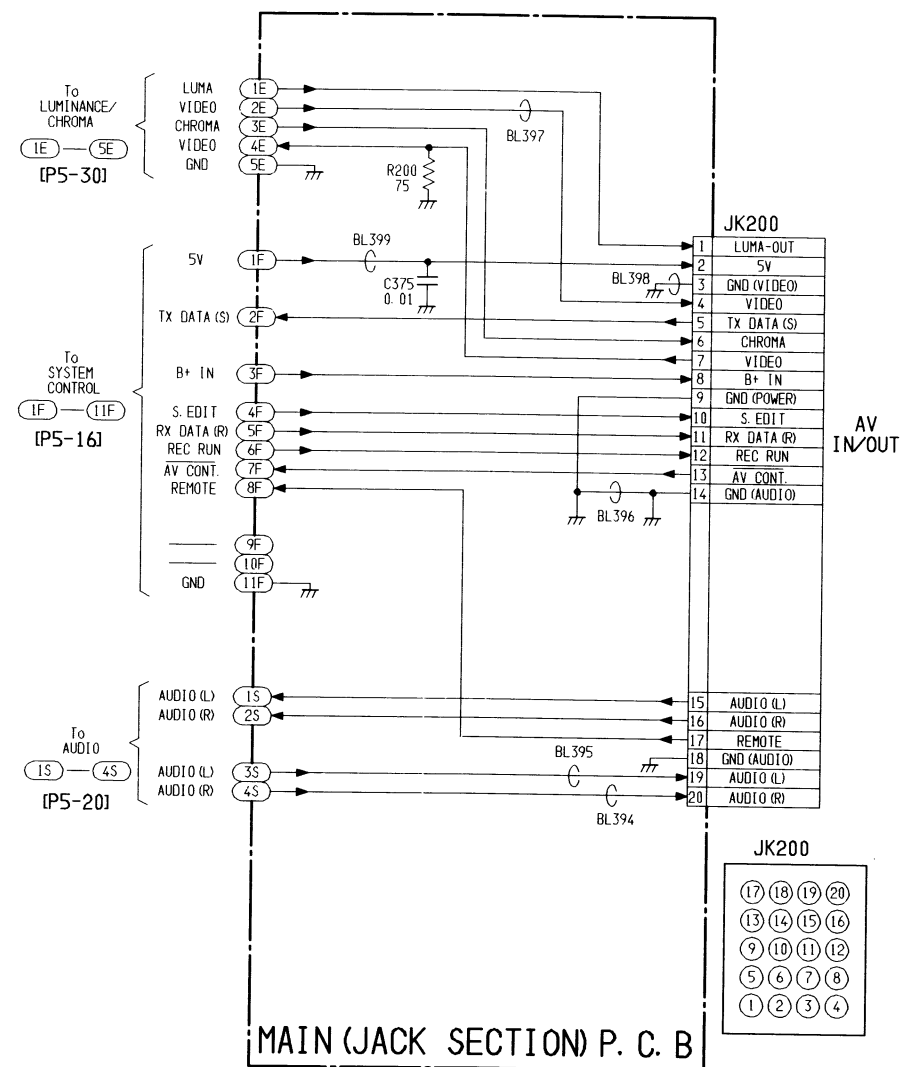
MAIN (PROCESS SECTION) P. C. B

NOTE: ADD 1000 TO ALL CIRCUIT NUMBERS IN CAMERA SECTION (FOR EXAMPLE READ R123 IS R1123 IN PARTS LIST.)
*VOLTAGE: REC MODE
○ WAVEFORMS No.

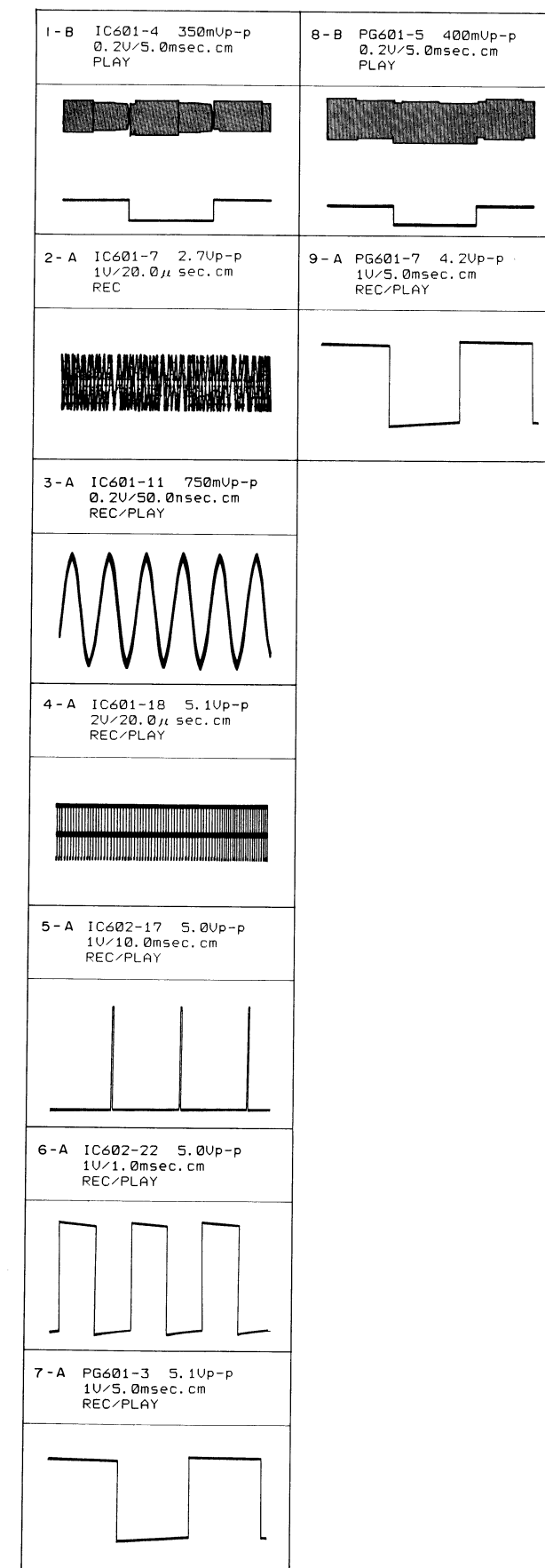
DIGITAL PROCESS (MAIN) SCHEMATIC DIAGRAM



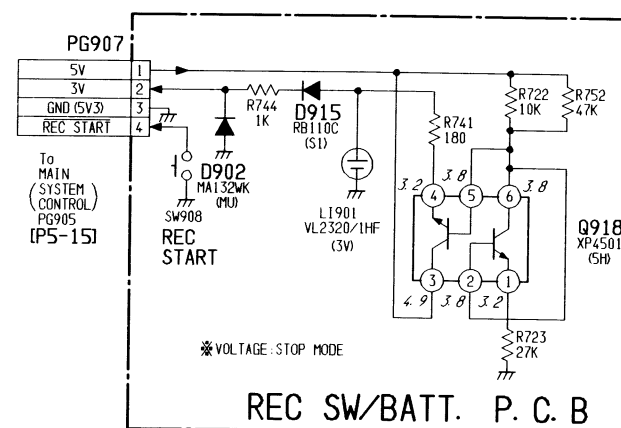
JACK (MAIN) SCHEMATIC DIAGRAM



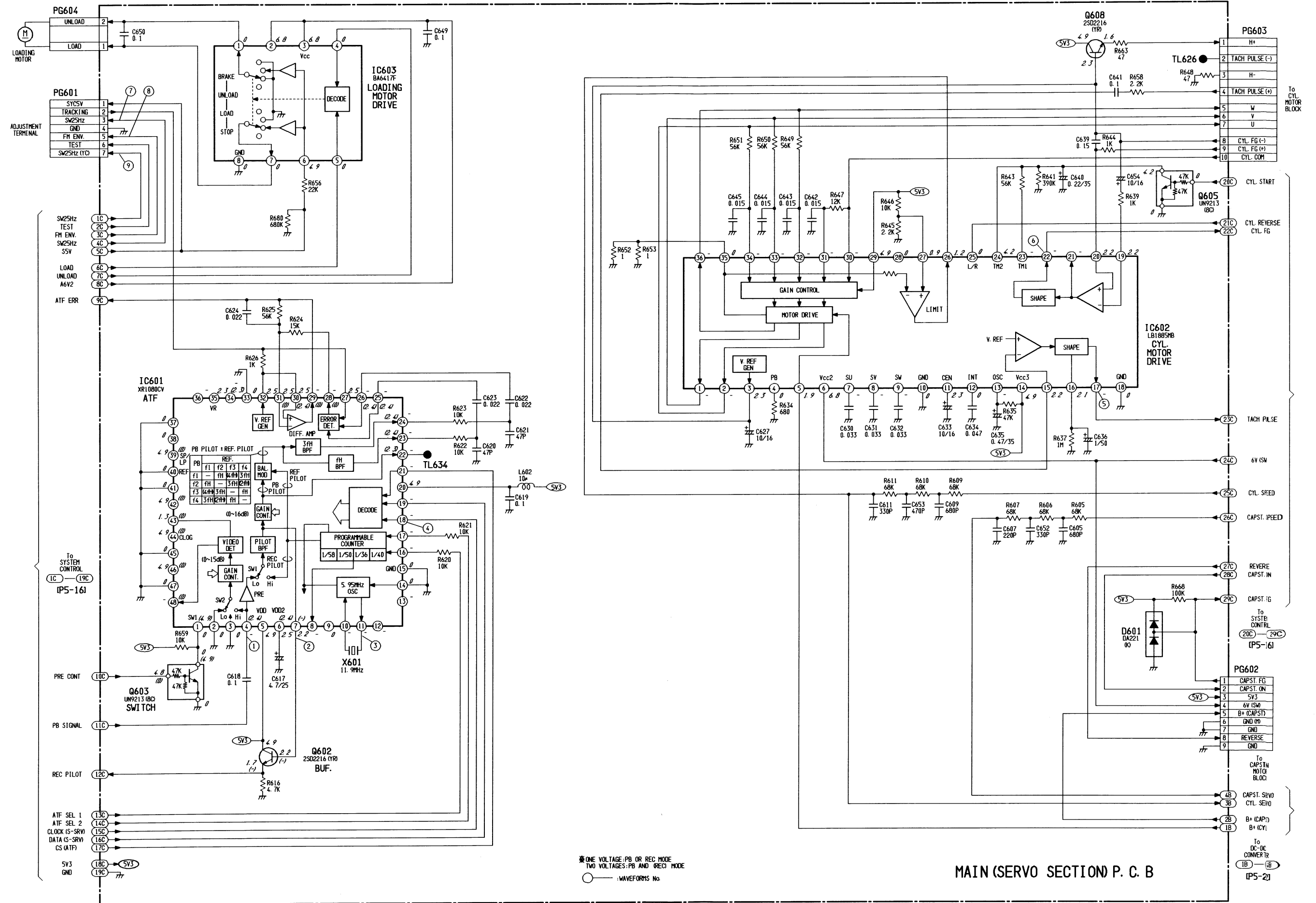
SERVO WAVEFORMS



REC SW/BATT. SCHEMATIC DIAGRAM



SERVO (MAIN) SCHEMATIC DIAGRAM



MAIN (SYSTEM CONTROL SECTION) P. C. B

IC901 PINOUT:

31	81	100	ATF SEL 2
32	82	99	VP
33	83	98	REW END
34	84	97	HD
35	85	96	PRE CONT.
36	86	95	FE CONT.
37	87	94	SQUELCH
38	88	93	REC
39	89	92	REVERSE
40	90	91	—
41	91	90	—
42	92	91	—
43	93	92	—
44	94	93	—
45	95	94	—
46	96	95	—
47	97	96	—
48	98	97	—
49	99	98	—
50	100	99	—

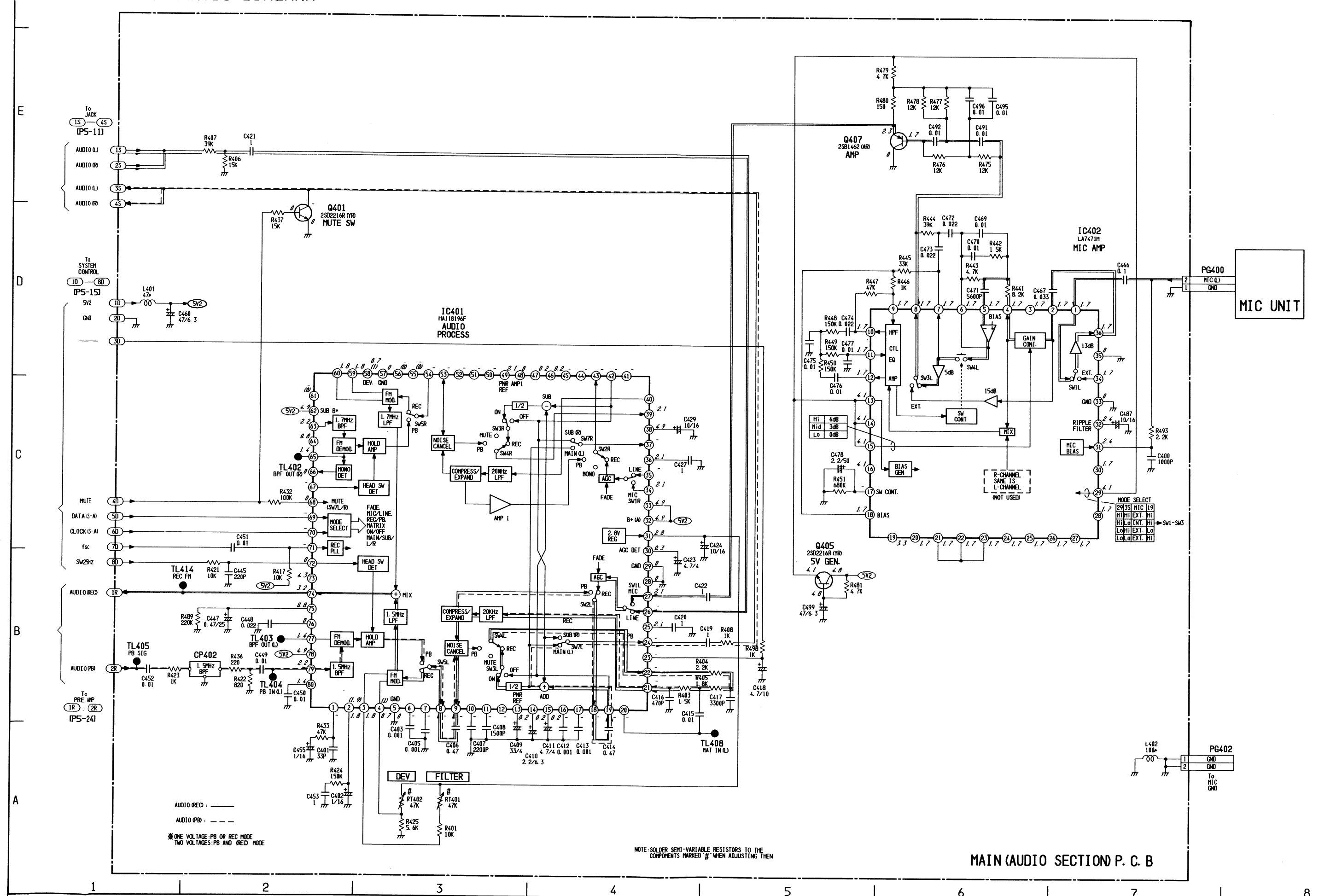
Legend:

- : WAVEFORMS No.
- *: ONE VOLTAGE: PB OR REC MODE
- : TWO VOLTAGES: PB AND REC MODE

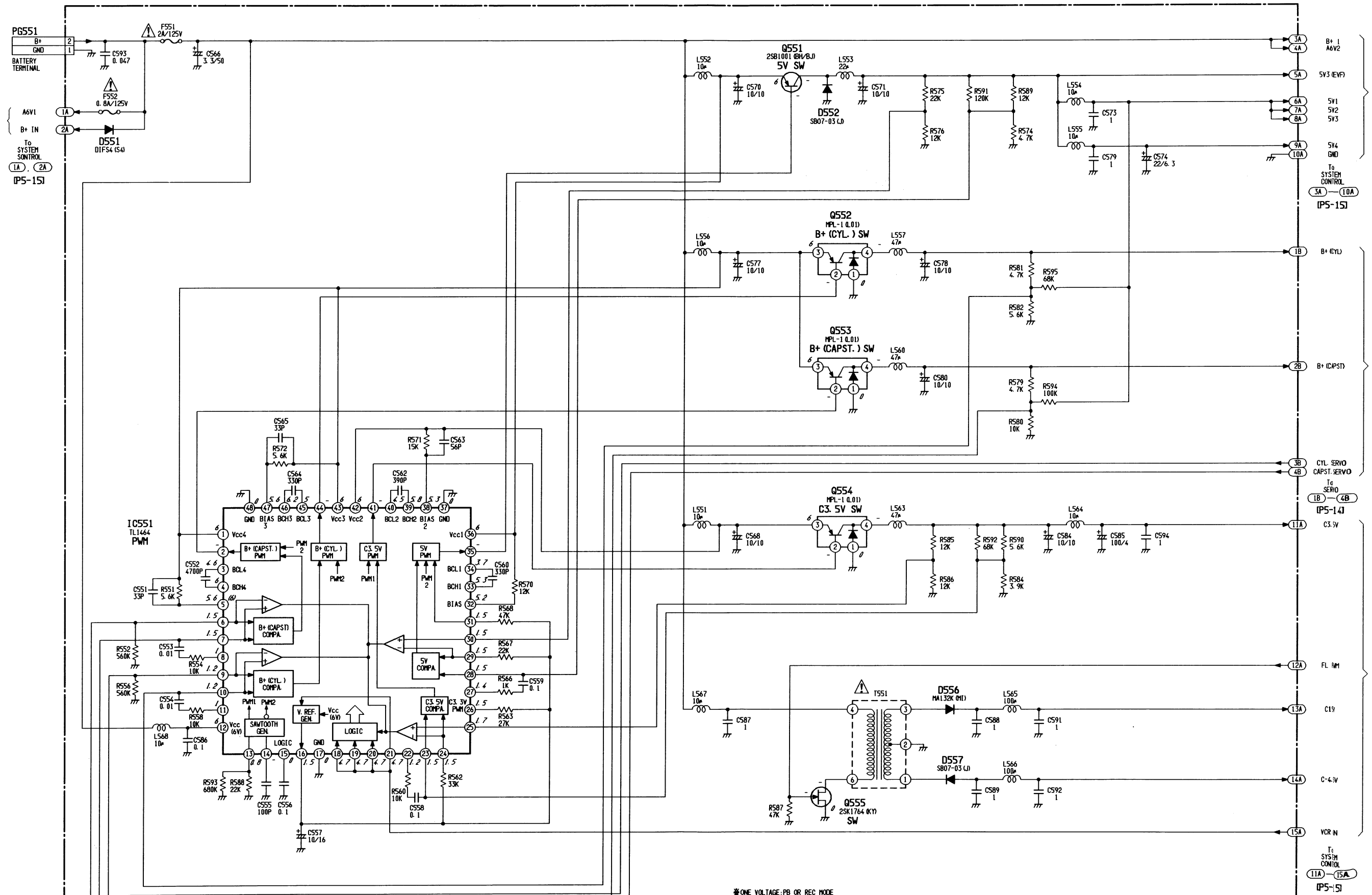
1-A	IC901-6	4.2Up-p	1V/5.0msec.cm	REC/PLAY	
2-A	IC901-42	4.7Up-p	1V/50.0nsec.cm	REC/PLAY	
3-A	IC901-47	5.0Up-p	1V/20.0μ sec.cm	REC/PLAY	
4-A	IC901-66	5.0Up-p	1V/20.0μ sec.cm	REC/PLAY	
5-A	IC901-68	5.0Up-p	1V/10.0msec.cm	REC/PLAY	
6-A	IC901-70	5.0Up-p	1V/200μ sec.cm	REC/PLAY	
7-A	IC901-87	5.3Up-p	1V/20.0μ sec.cm	REC/PLAY	

[illegible]

AUDIO (MAIN) SCHEMATIC DIAGRAM



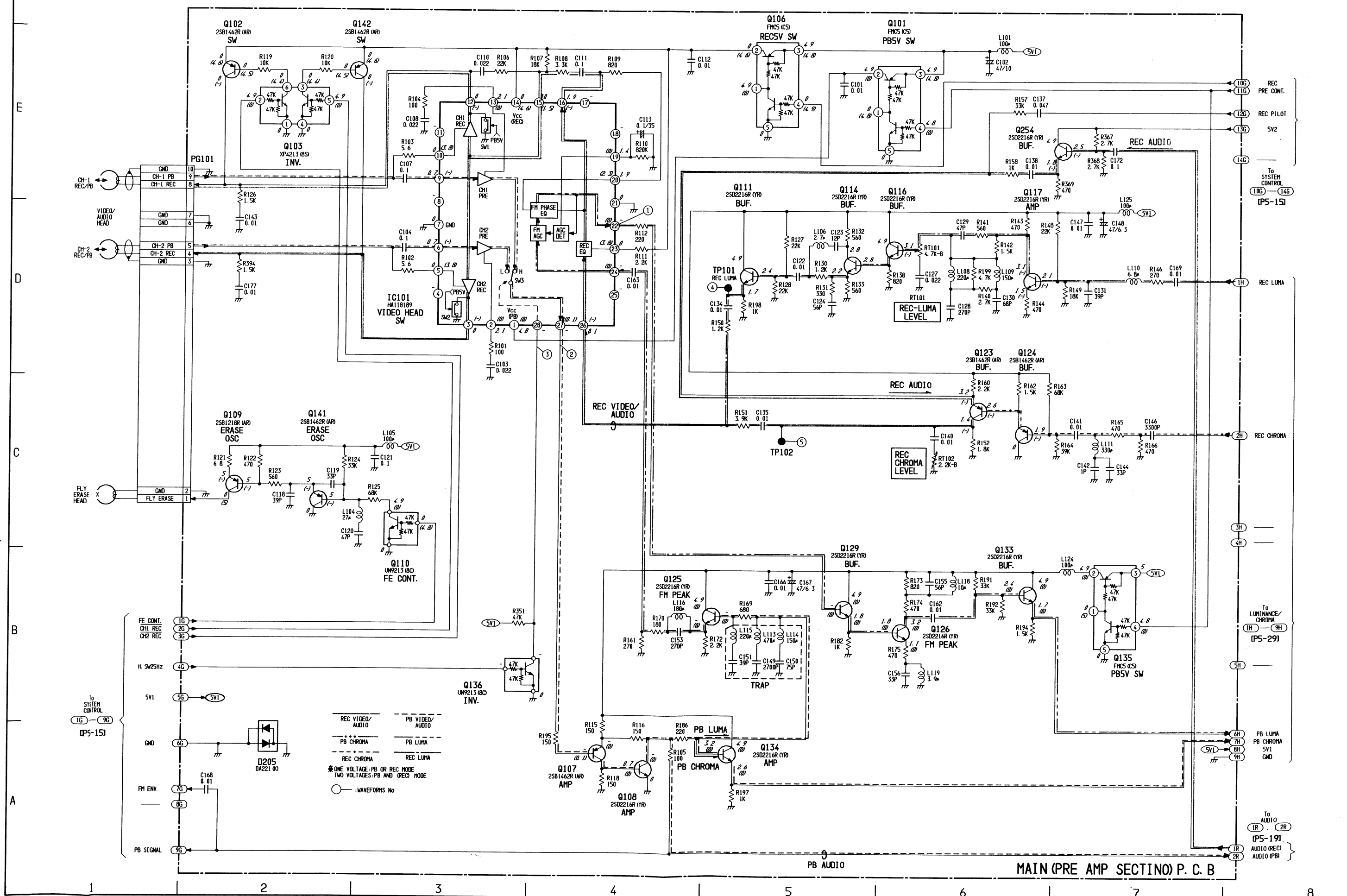
DC-DC CONVERTER (MAIN) SCHEMATIC DIAGRAM



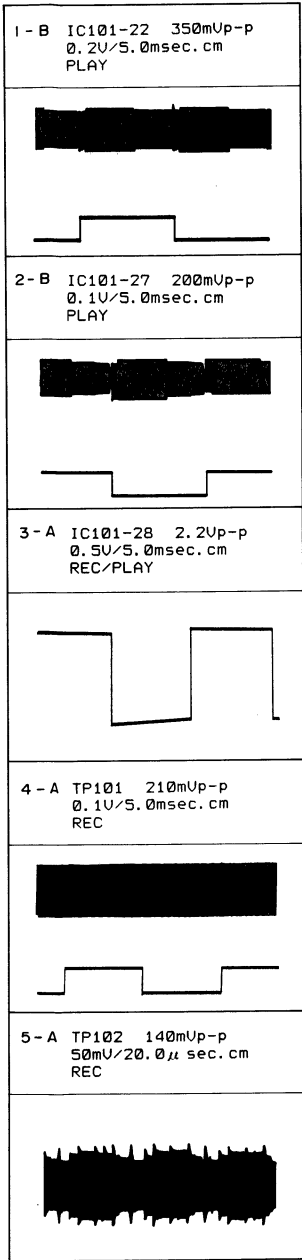
*ONE VOLTAGE:PB OR REC MODE
TWO VOLTAGES:PB AND REC MODE

MAIN (DC-DC CONVERTER SECTION) P. C. B

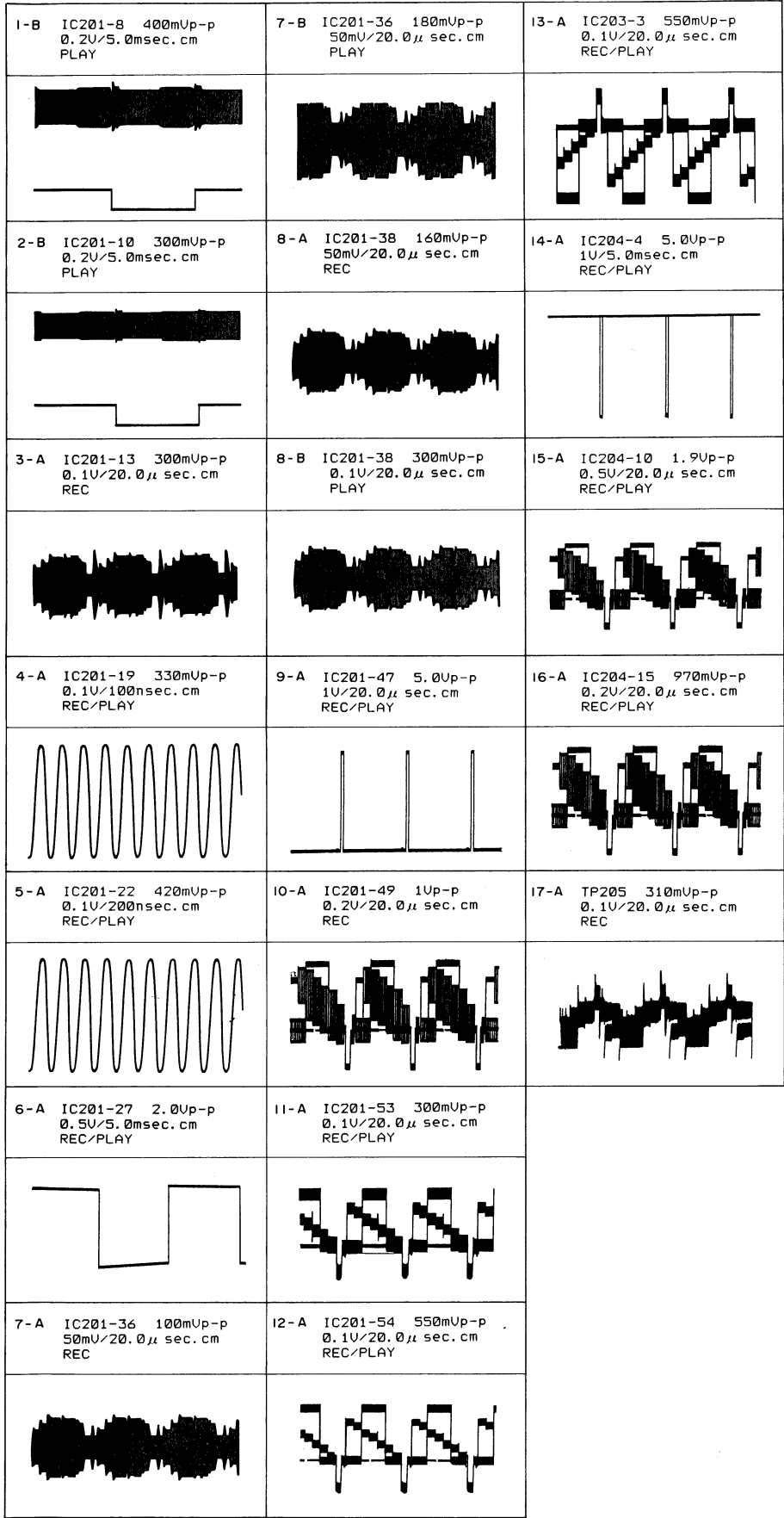
PRE AMP (MAIN) SCHEMATIC DIAGRAM



PRE AMP WAVEFORMS



LUMINANCE/CHROMA WAVEFORMS



MAIN (1H DELAY) SECTION P. C. B.

NOTE: SOLDER SEMI-VARIABLE RESISTORS TO THE COMPONENTS MARKED # WHEN ADJUSTING THEN

○ : WAVEFORMS No

* ONE VOLTAGE: PB OR REC MODE
TWO VOLTAGES: PB AND REC MODE

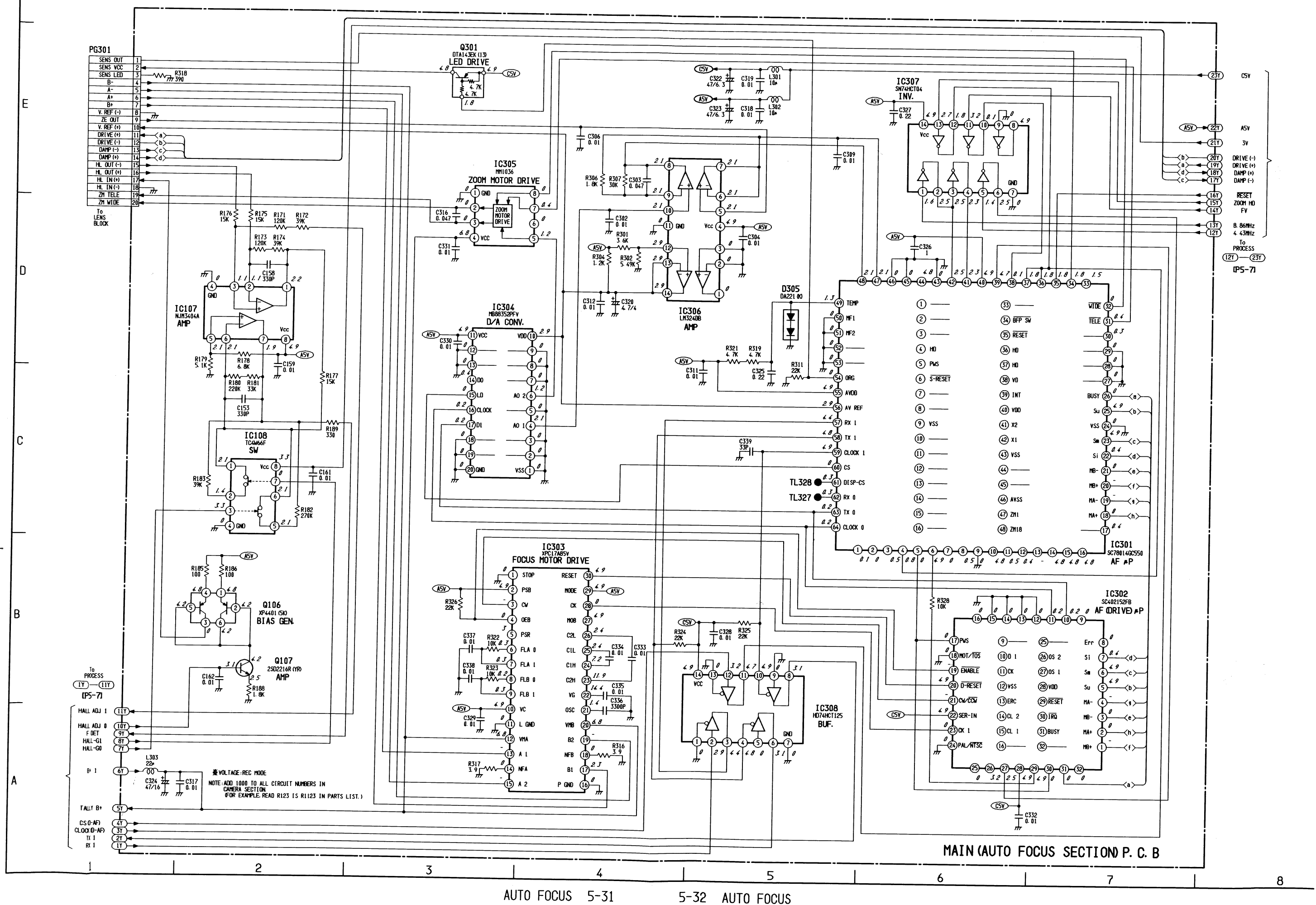
TO LUMINANCE/CHROMA
IP5-301

REC/EE VIDEO
PB VIDEO
REC LUMA
PB LUMA
REC CHROMA
PB CHROMA

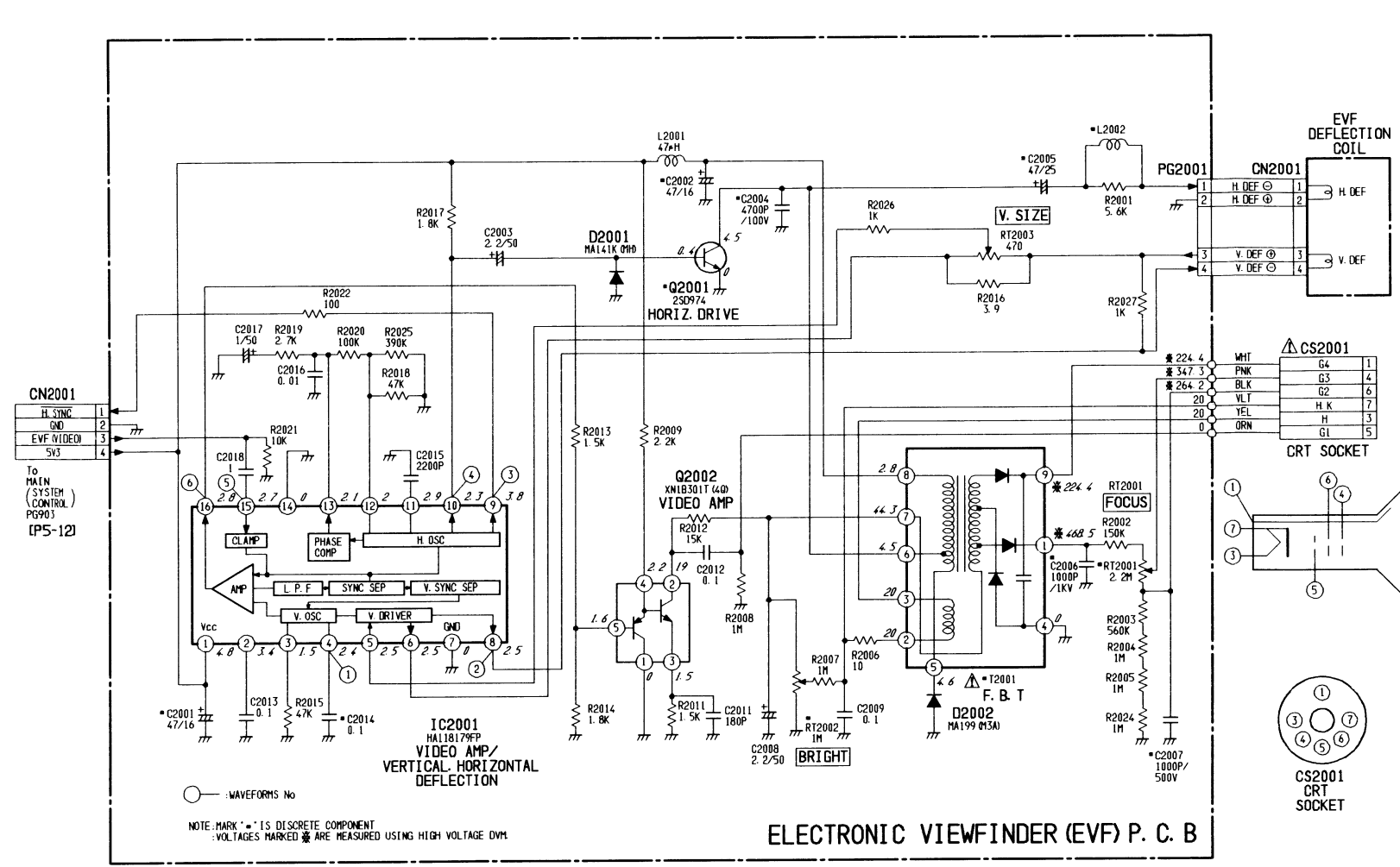
NOTE: SOLDER SEMI-VARIABLE RESISTORS TO THE COMPONENTS MARKED # WHEN ADJUSTING THEM.
* ONE VOLTAGE: PB OR REC MODE
TWO VOLTAGES: PB AND REC MODE
○: WAVEFORMS No.

MAIN (LUMINANCE/CHROMA) SECTION P. C. B.

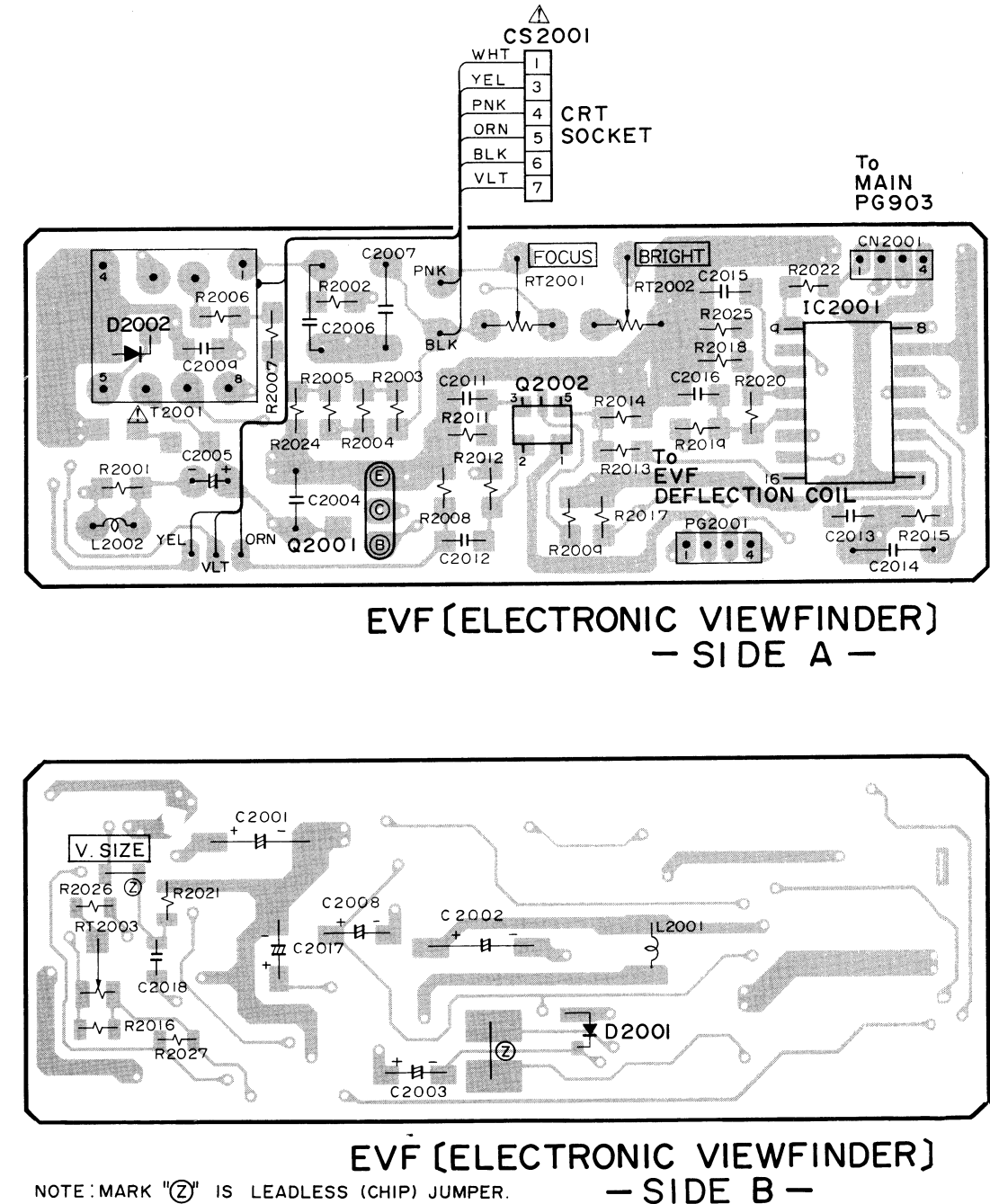
AUTO FOCUS (MAIN) SCHEMATIC DIAGRAM



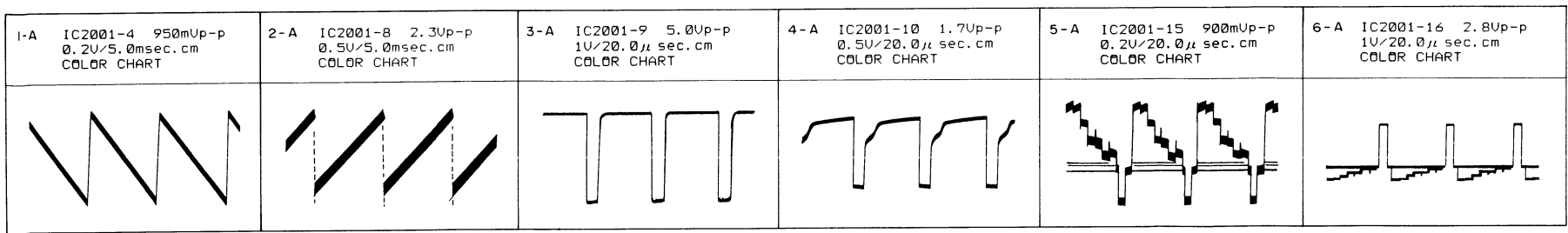
ELECTRONIC VIEWFINDER (EVF) SCHEMATIC DIAGRAM



ELECTRONIC VIEWFINDER (EVF) CIRCUIT BOARD



ELECTRONIC VIEWFINDER (EVF) WAVEFORMS



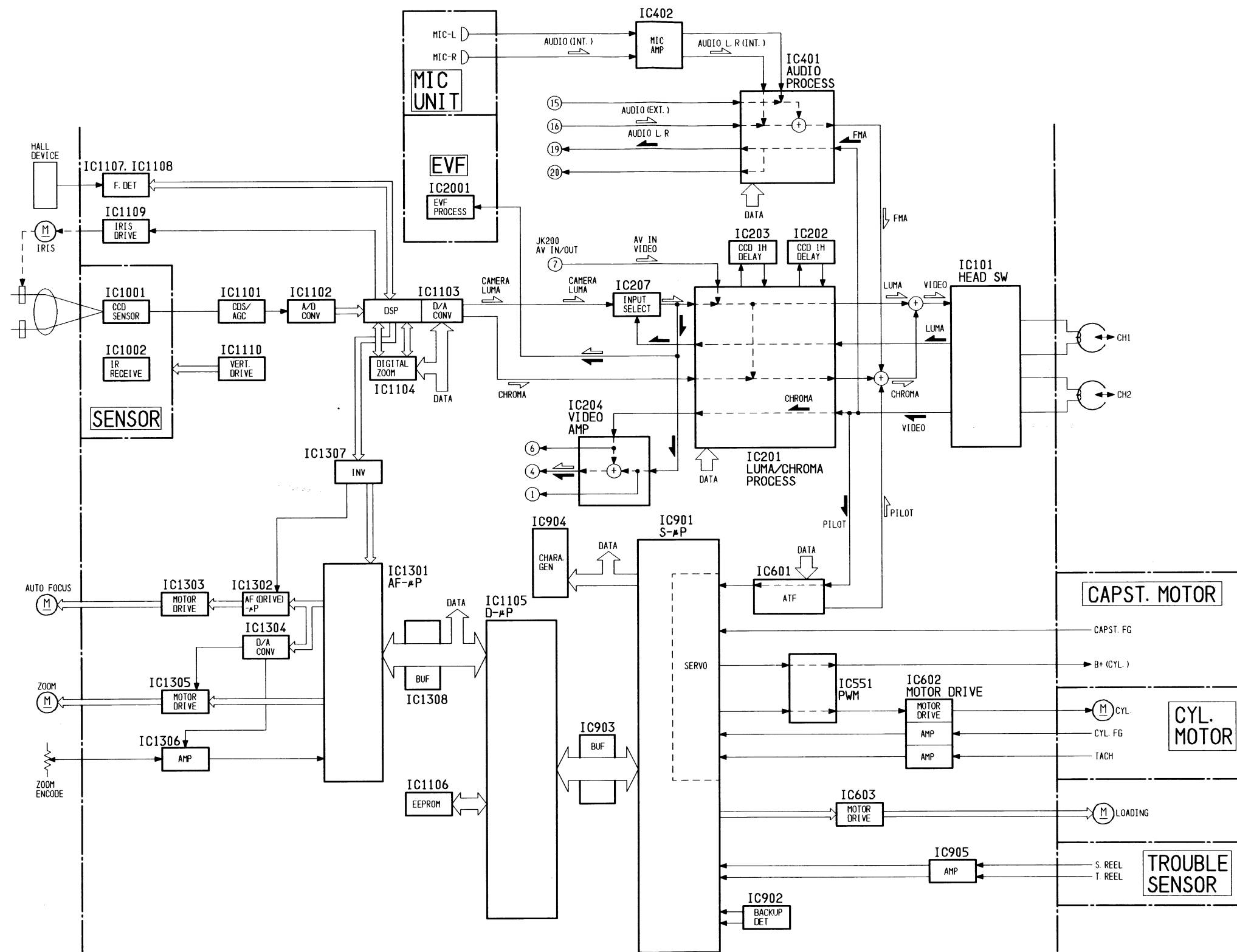
M870

BLOCK DIAGRAMS & SCHEMATIC DIAGRAMS

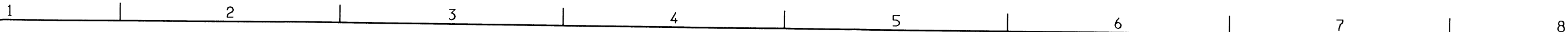
M820, M870 CIRCUIT BOARD LAYOUTS

BLOCK DIAGRAMS

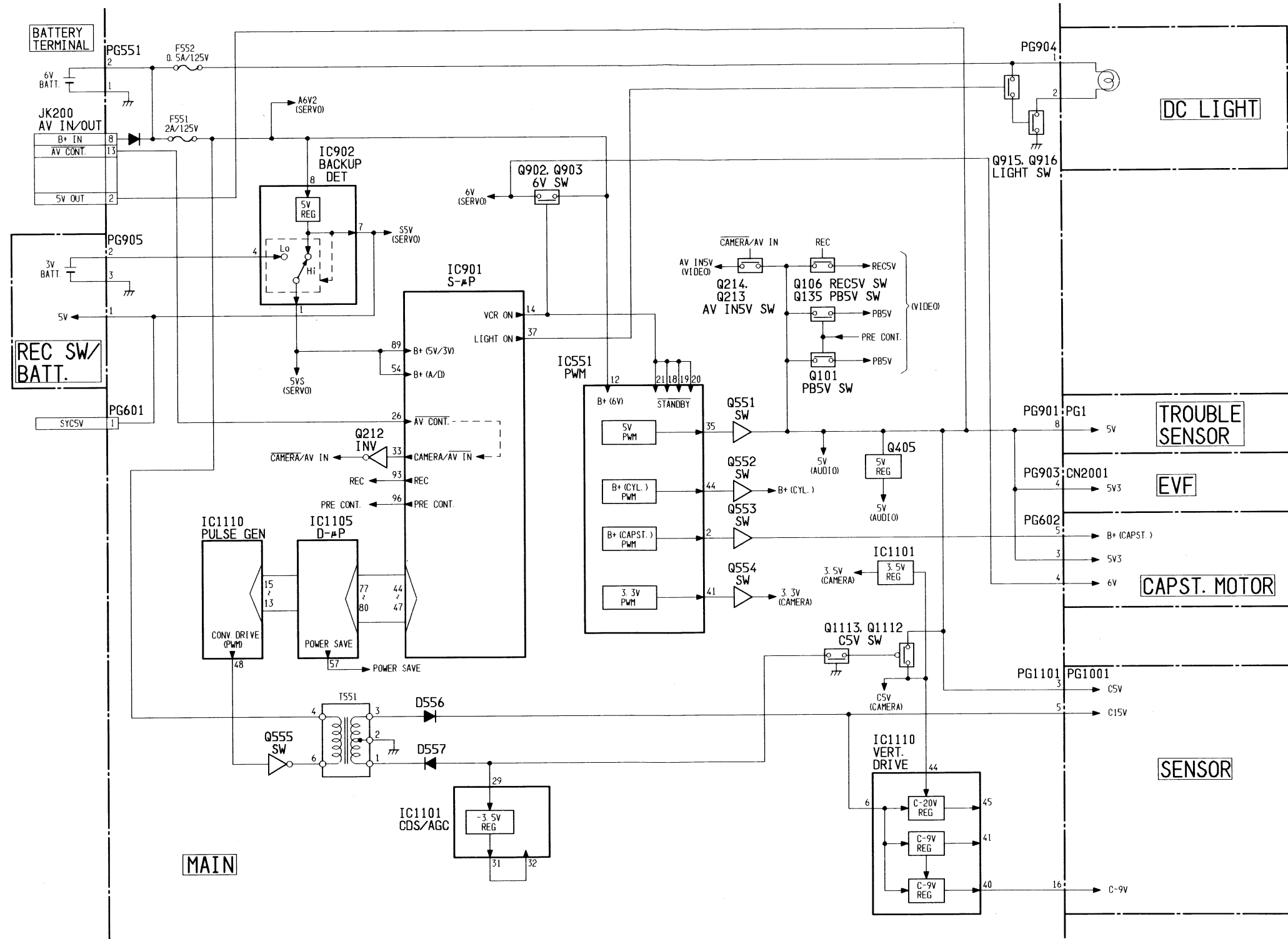
1. OVERALL



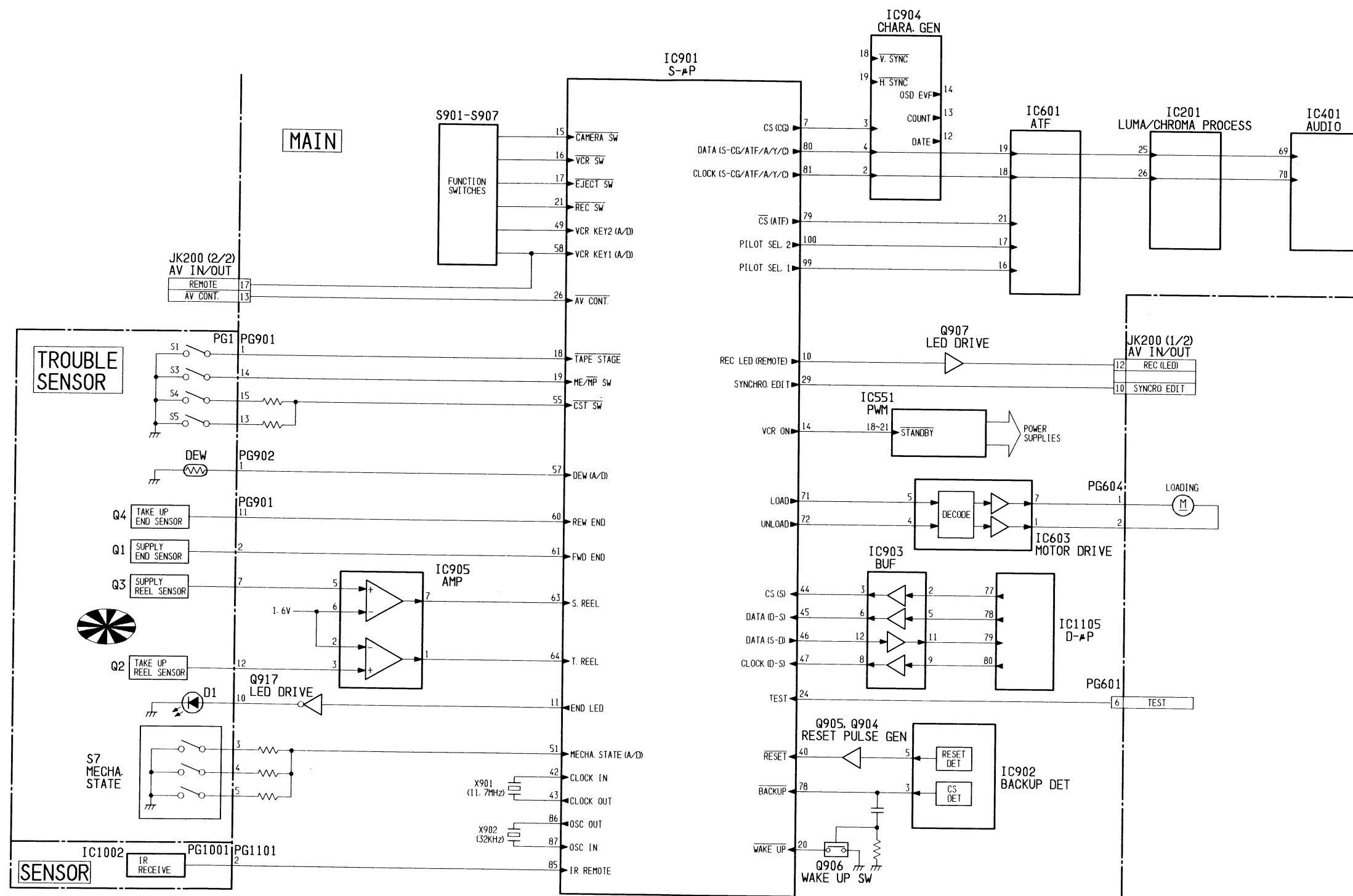
A vertical scale with five horizontal tick marks. The labels A, B, C, D, and E are positioned to the right of the scale, corresponding to the tick marks from bottom to top.



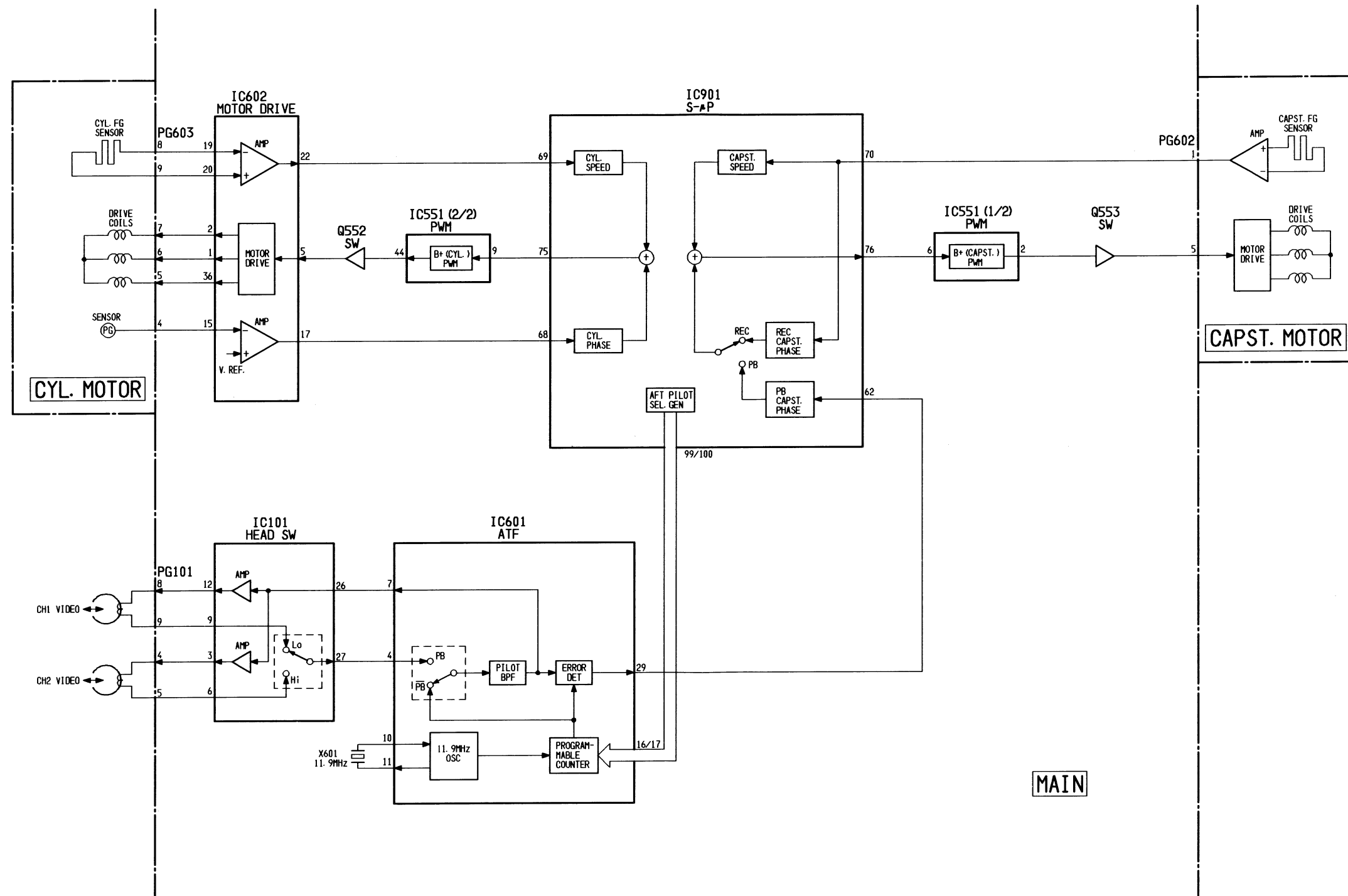
3. POWER



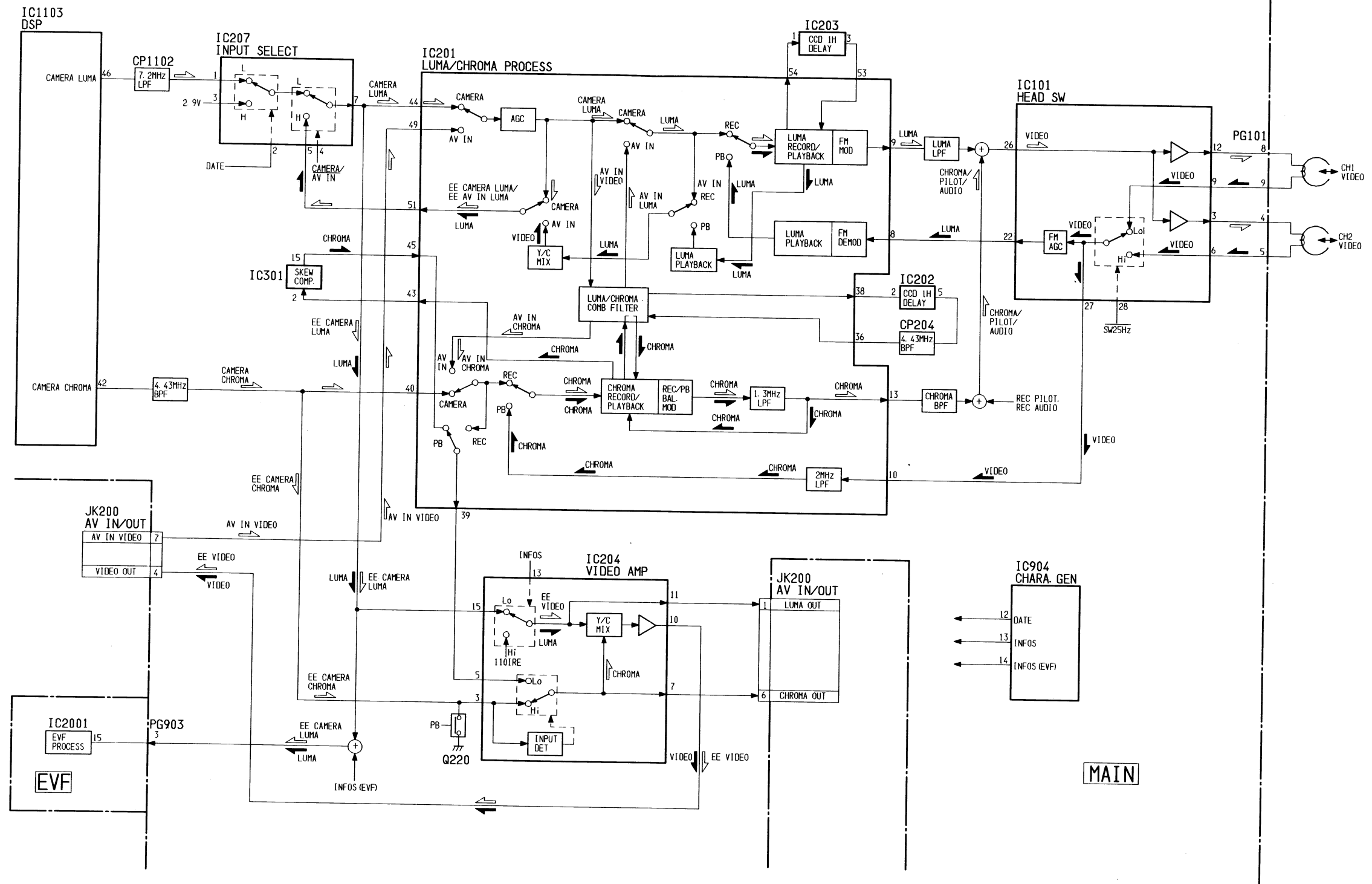
4. SYSTEM CONTROL



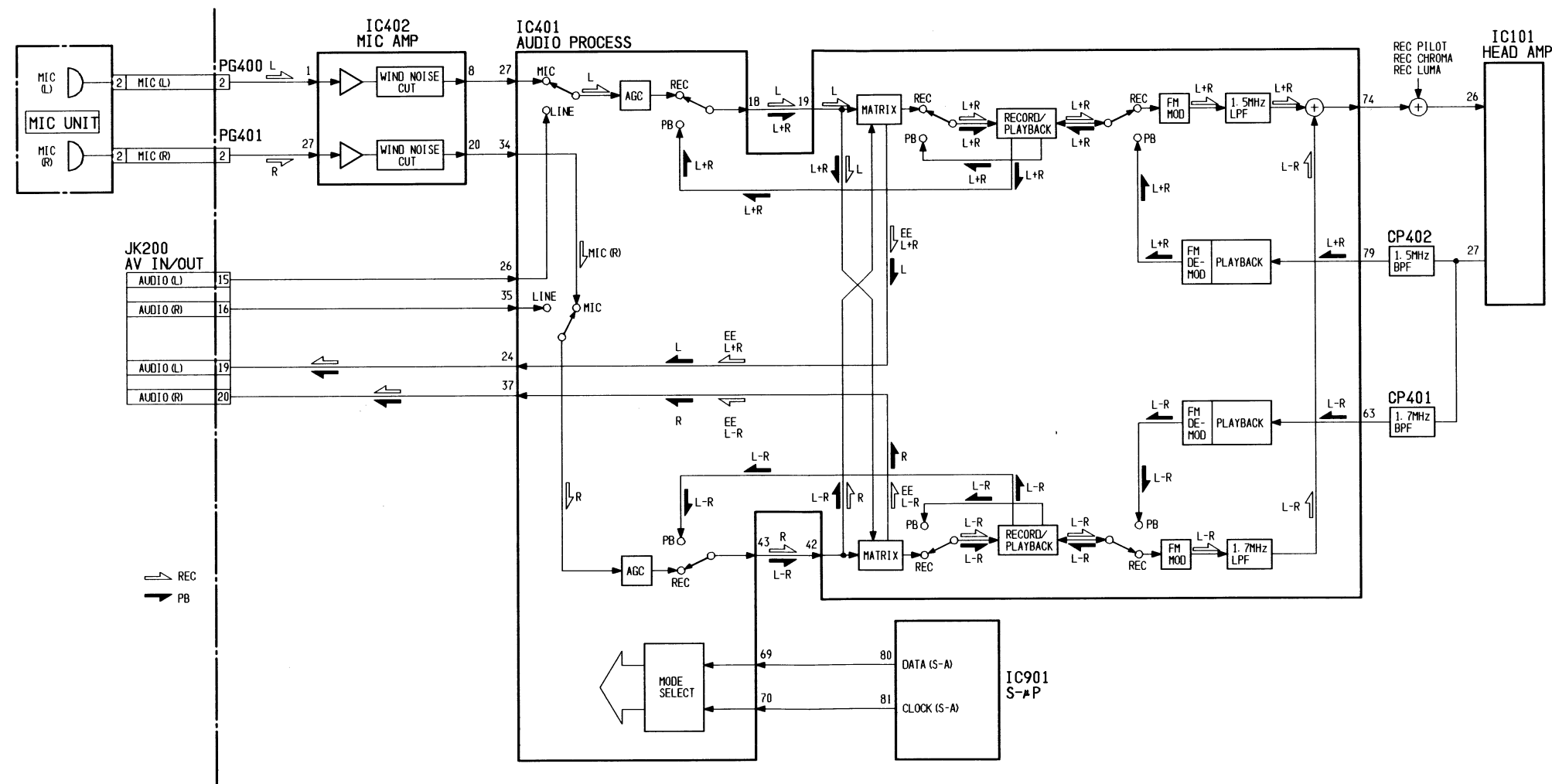
5. SERVO



6. VIDEO



7. AUDIO



SCHEMATIC &
CIRCUIT BOARD DIAGRAMS

[Parts Location Indexing Tables]

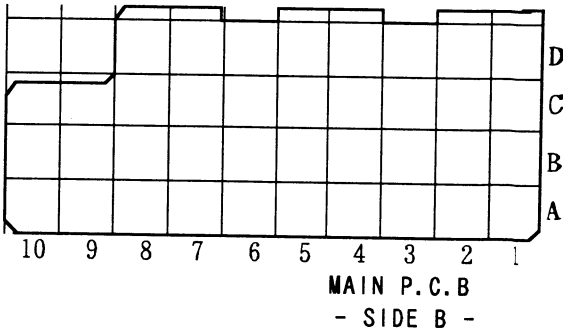
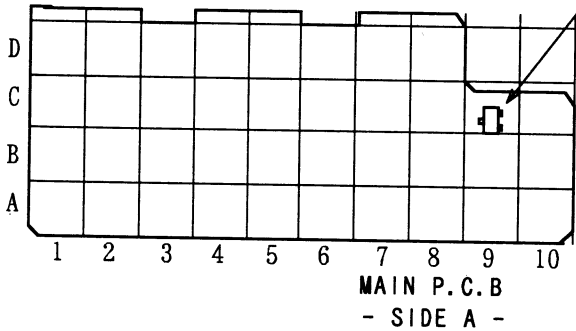
This service manual shows the parts location indexing tables beside the major circuit board diagrams. These tables indicate the locations of each part on the circuit boards. Use the tables to locate the parts on the circuit boards.

IDENTIFICATION OF PARTS LOCATION

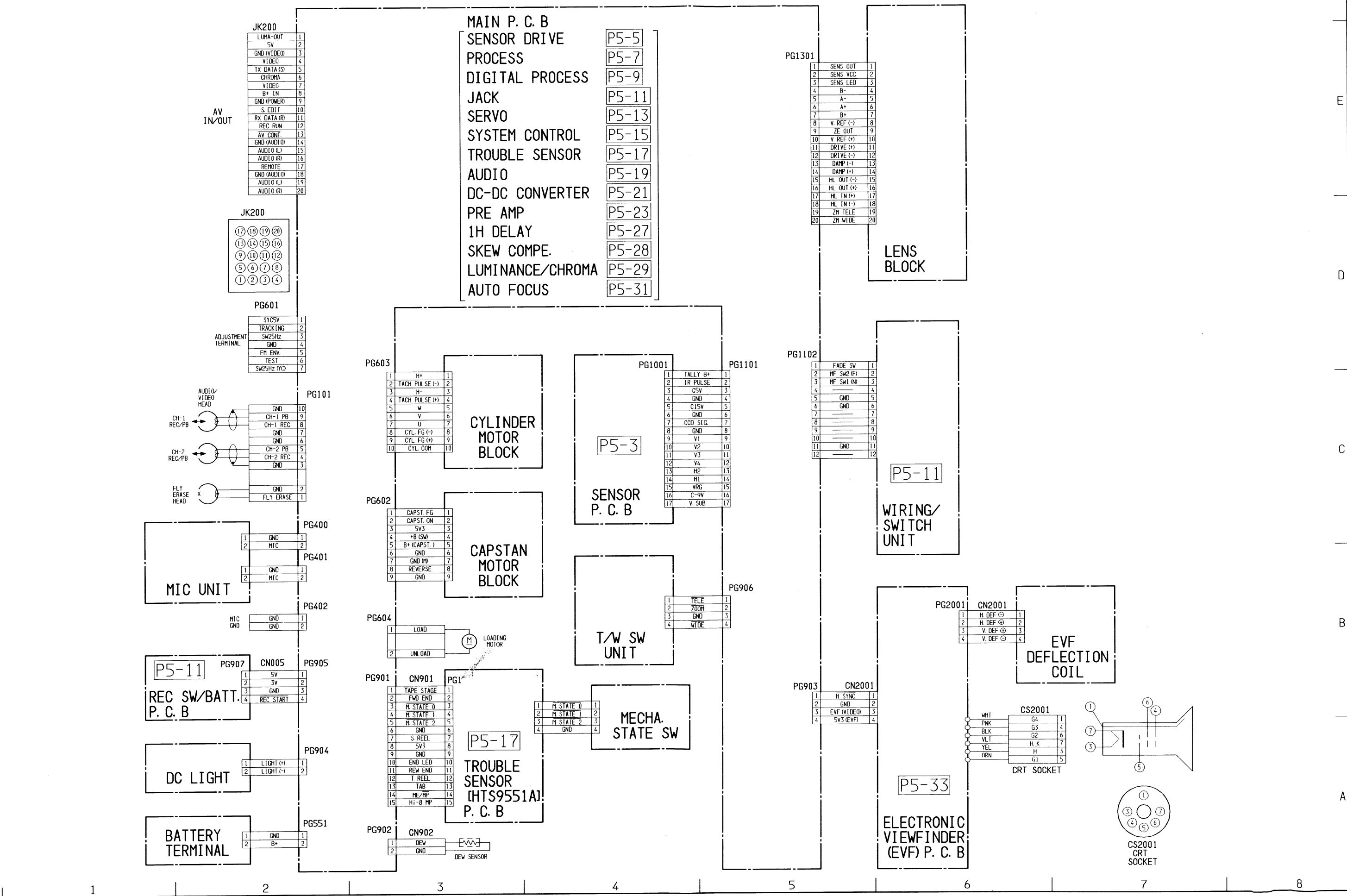
Symbol N o.	Parts Location
C201	A-2B
C202	B-3B
C203	A-4A

Symbol N o.	Parts Location
R201	B-5C
R202	A-5B
Q216	A-9C

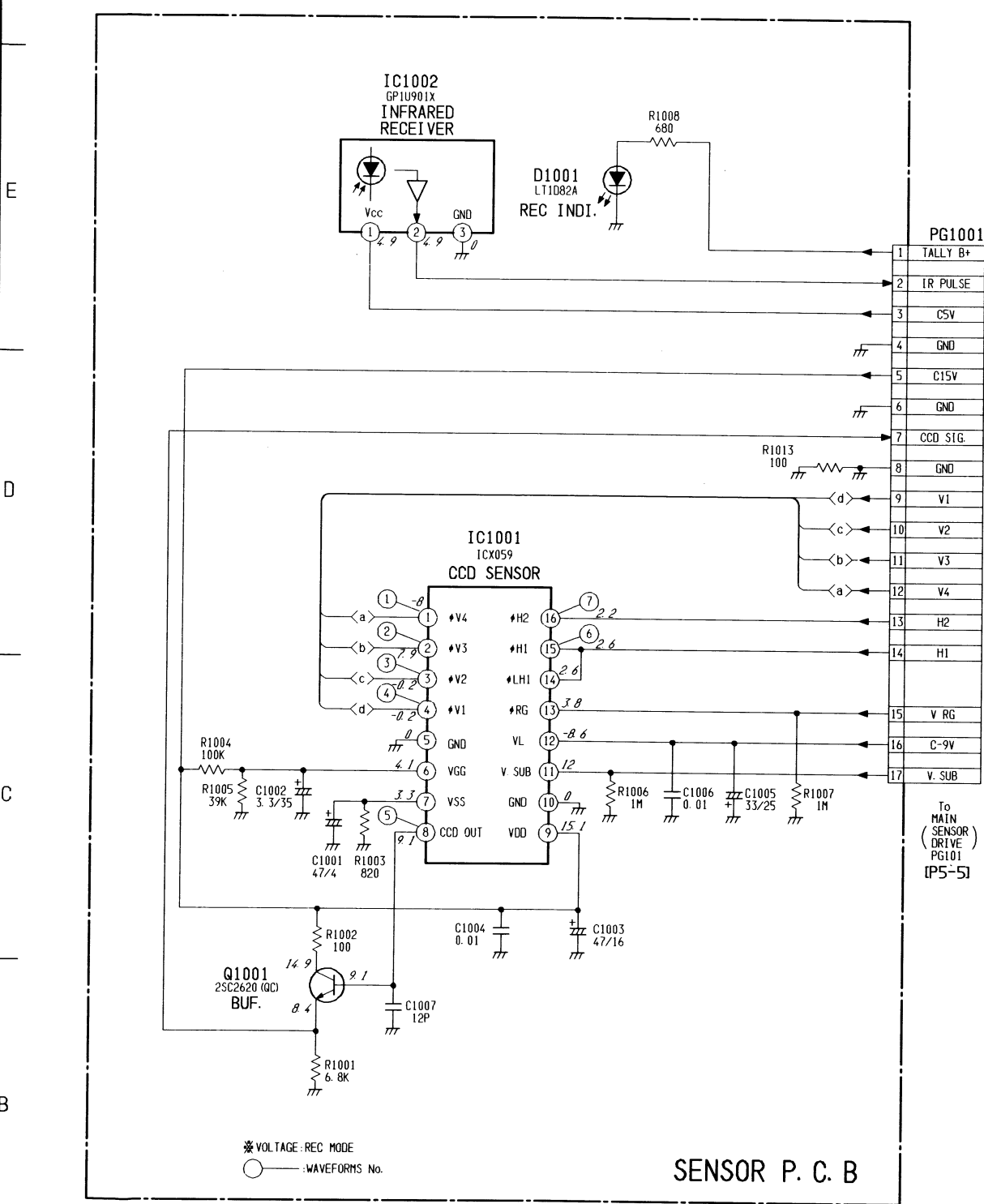
A-9C
Location
Face of board



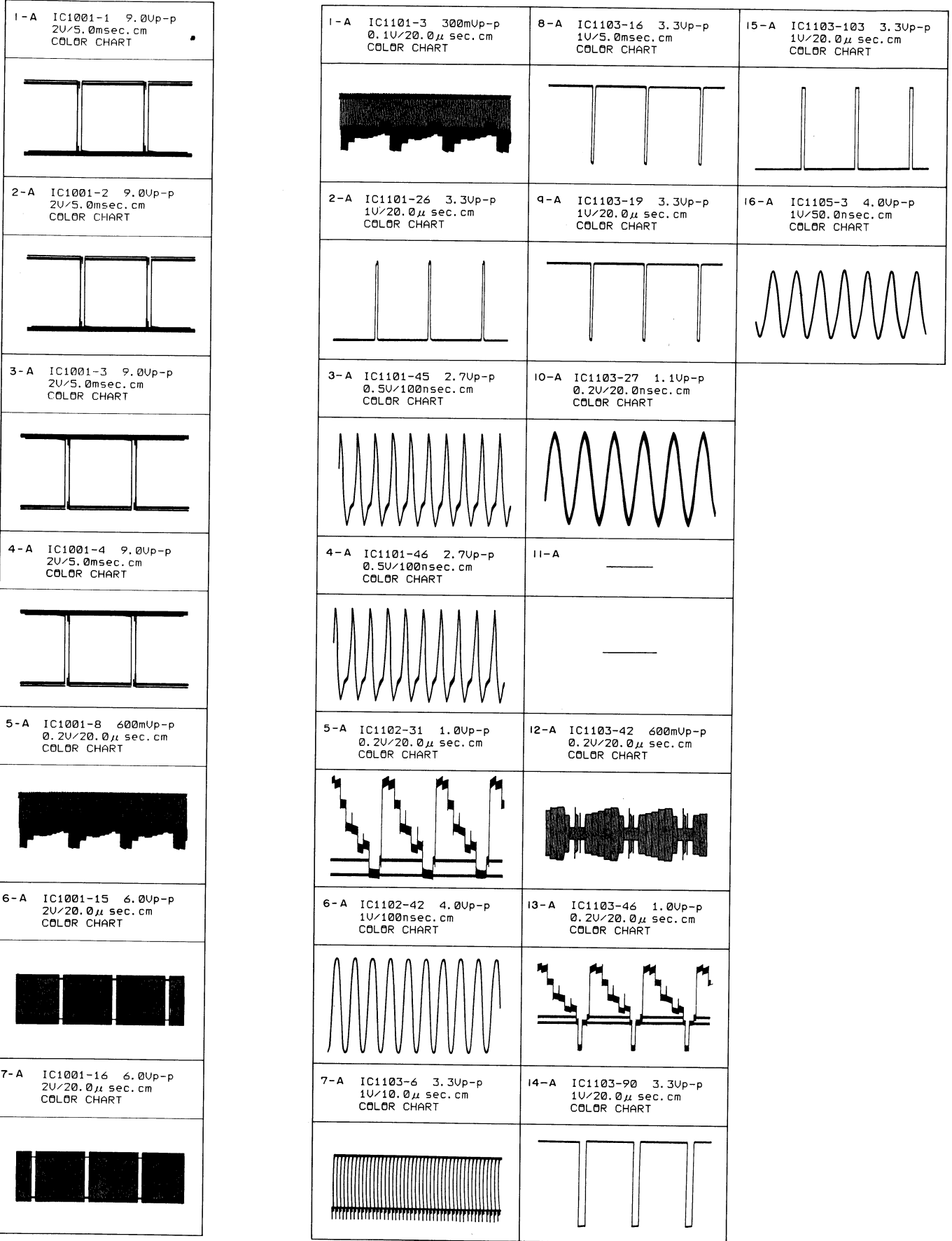
INTERNAL WIRING DIAGRAM



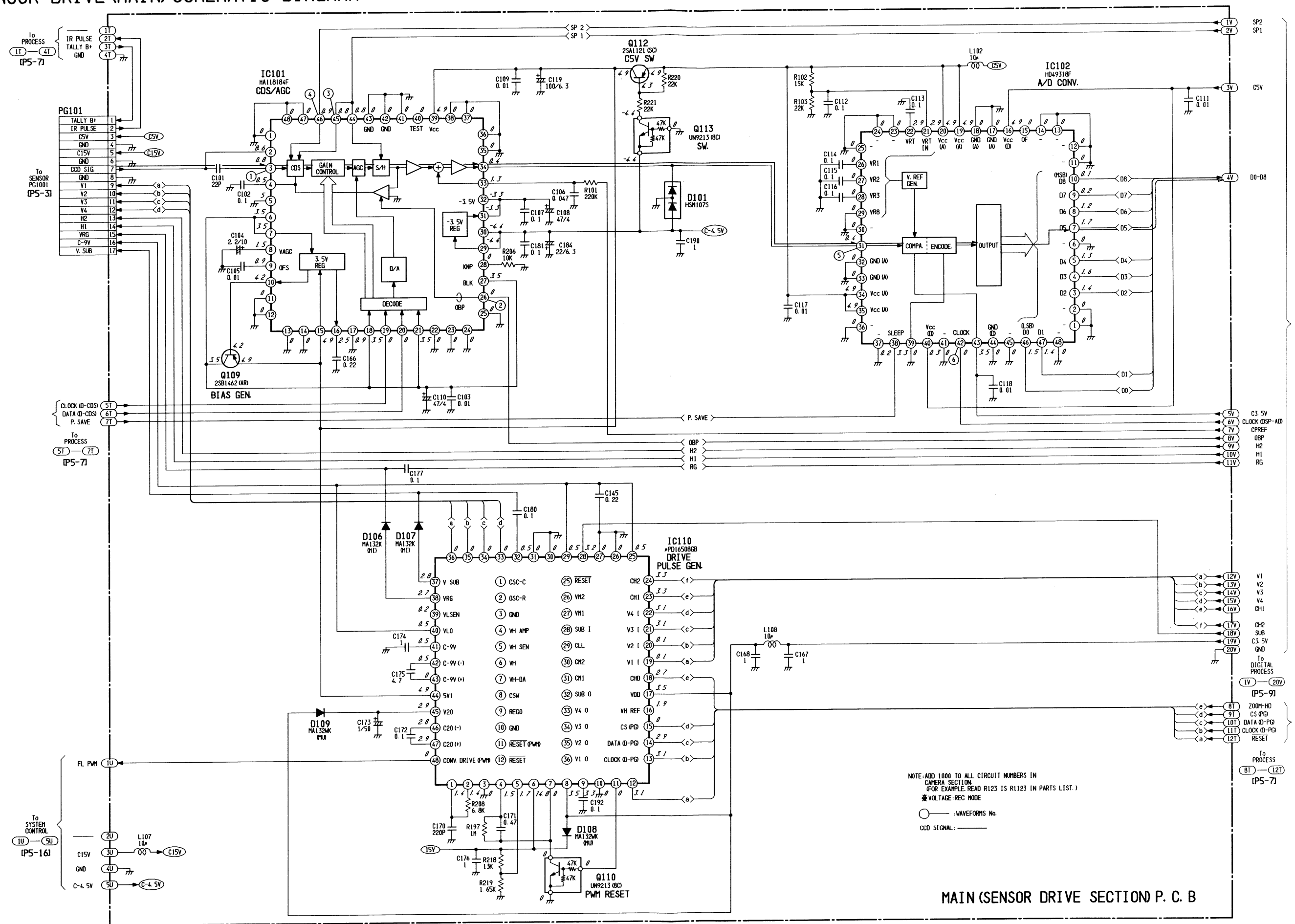
SENSOR SCHEMATIC DIAGRAM



SENSOR/PROCESS WAVEFORMS

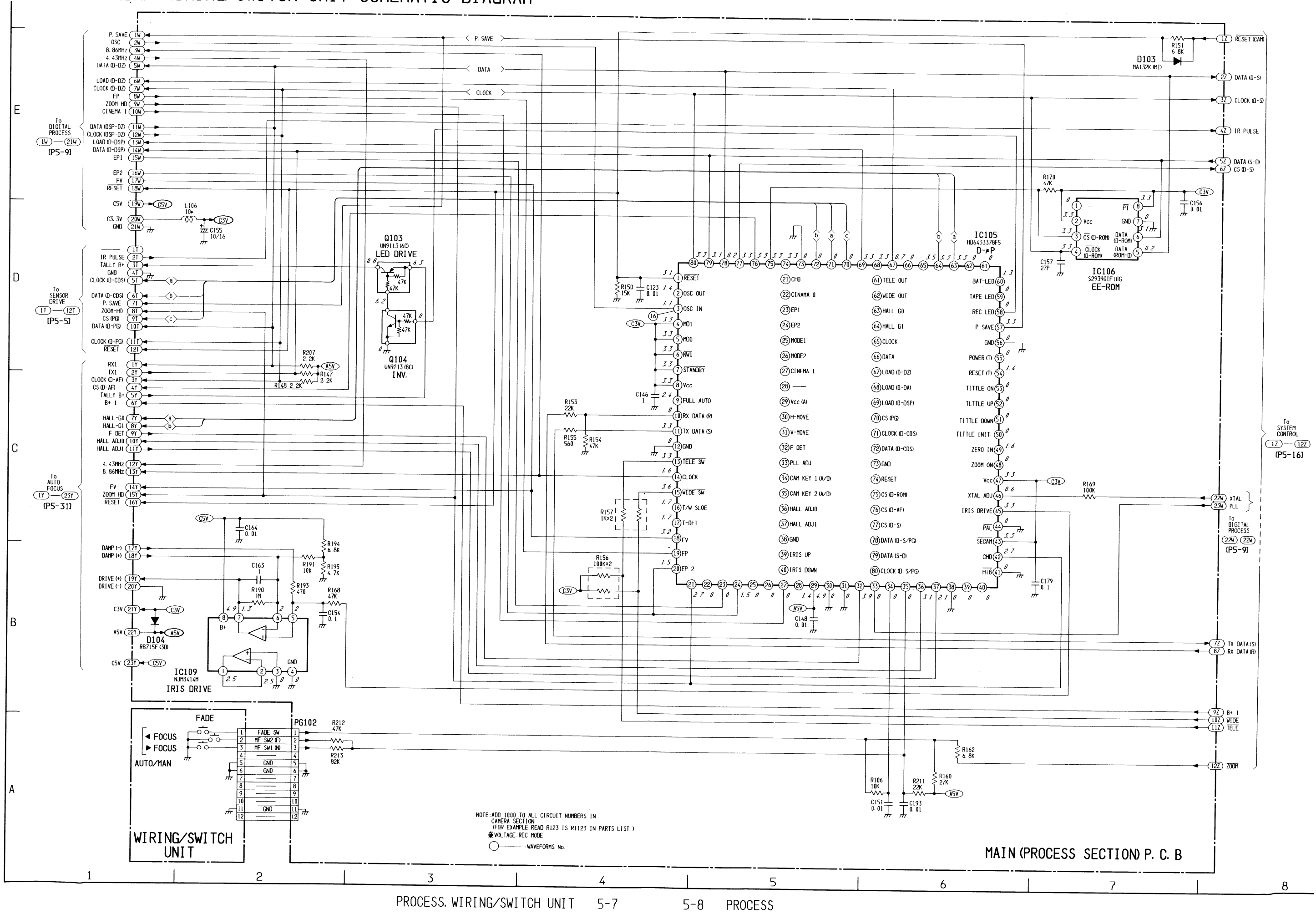


SENSOR DRIVE (MAIN) SCHEMATIC DIAGRAM

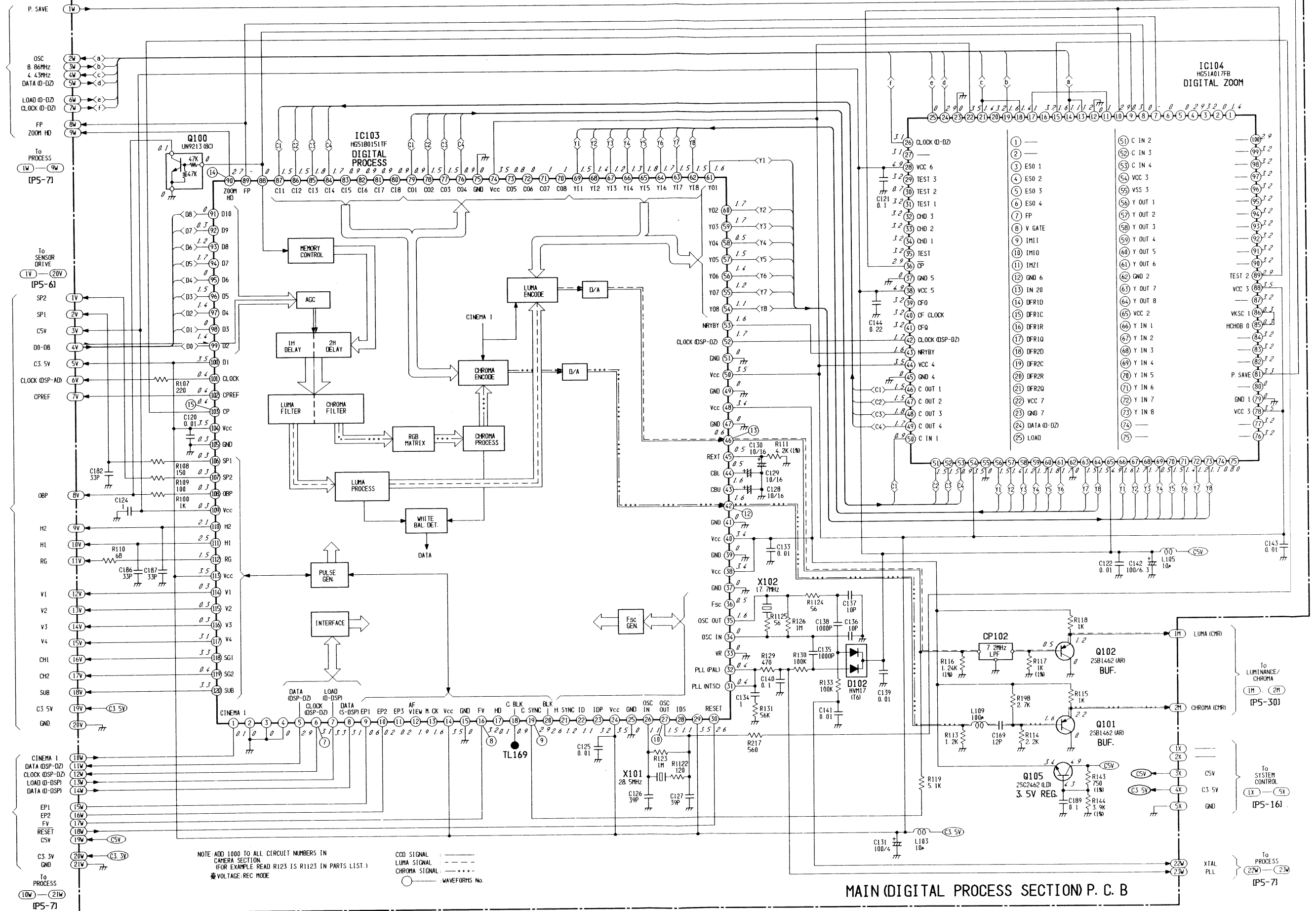


MAIN (SENSOR DRIVE SECTION) P. C. B

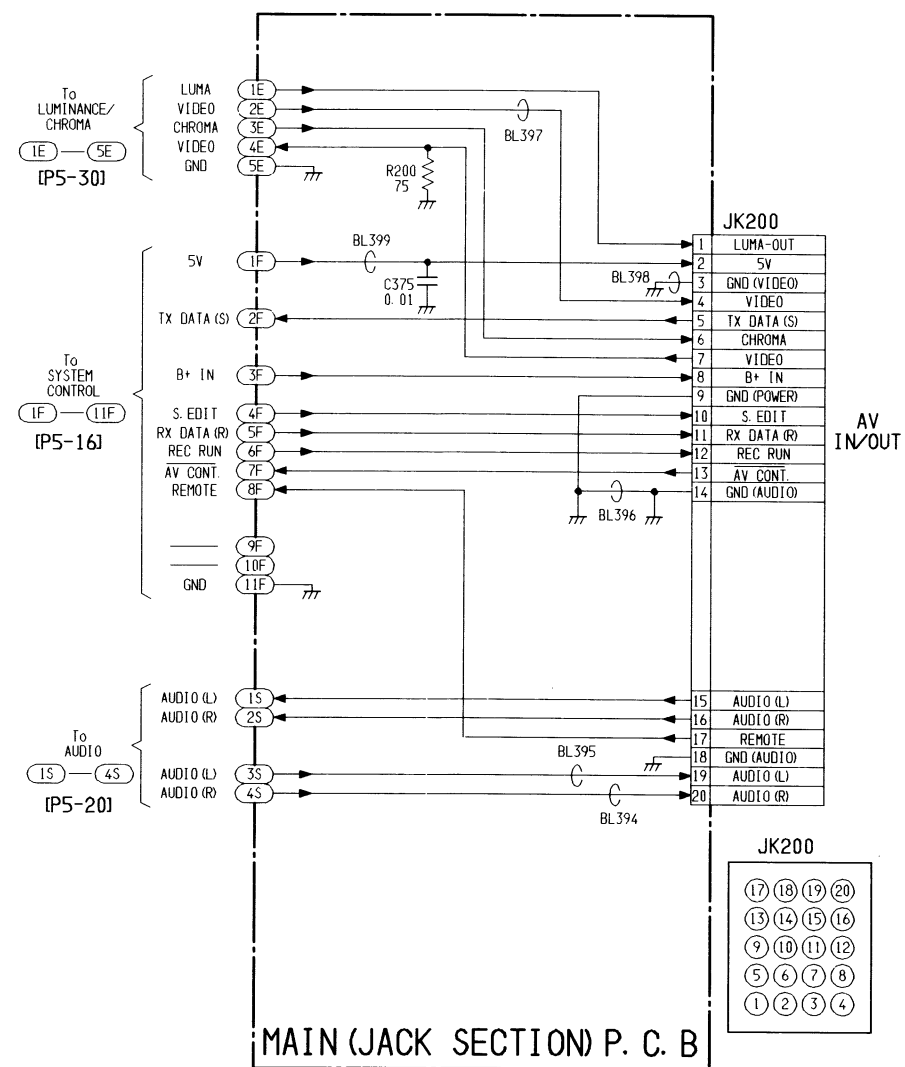
PROCESS (MAIN). WIRING/SWITCH UNIT SCHEMATIC DIAGRAM



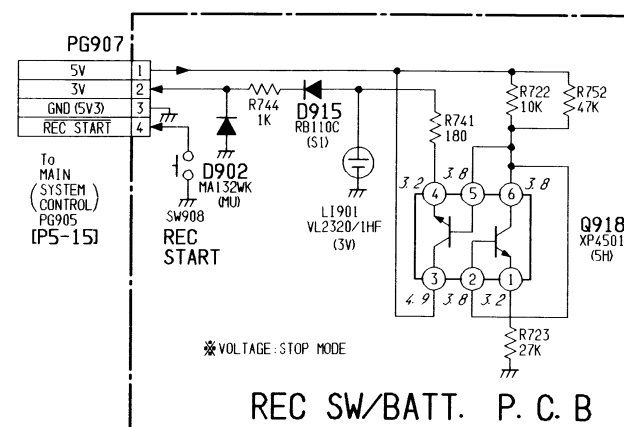
DIGITAL PROCESS (MAIN) SCHEMATIC DIAGRAM



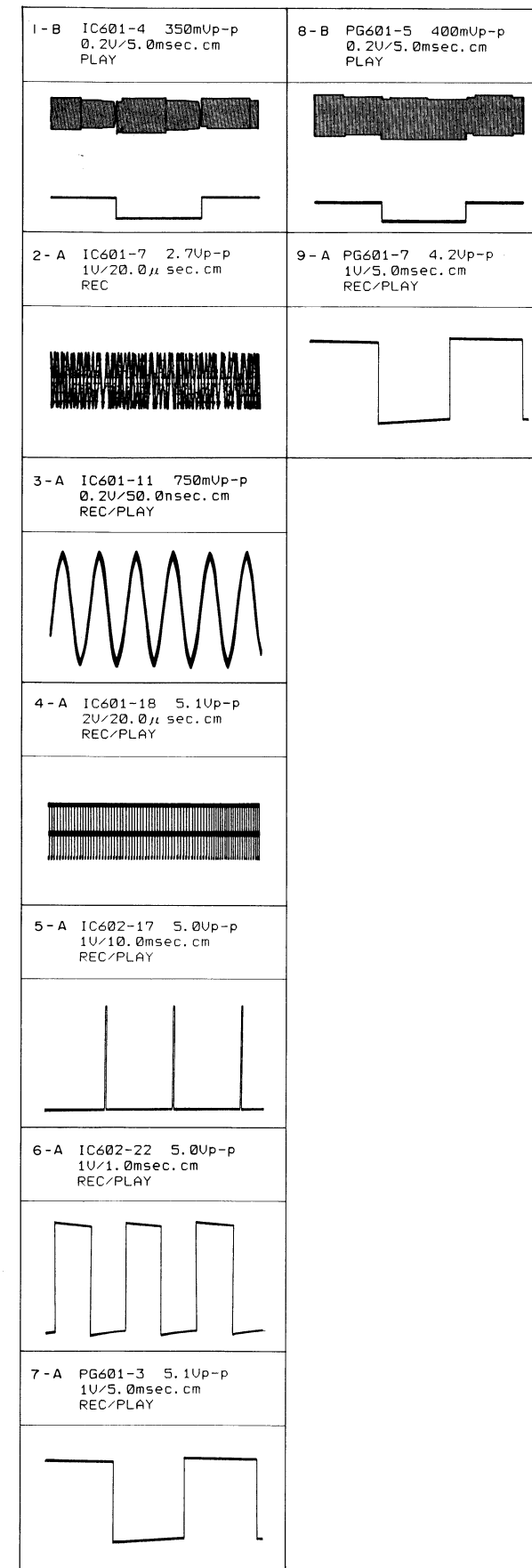
JACK (MAIN) SCHEMATIC DIAGRAM



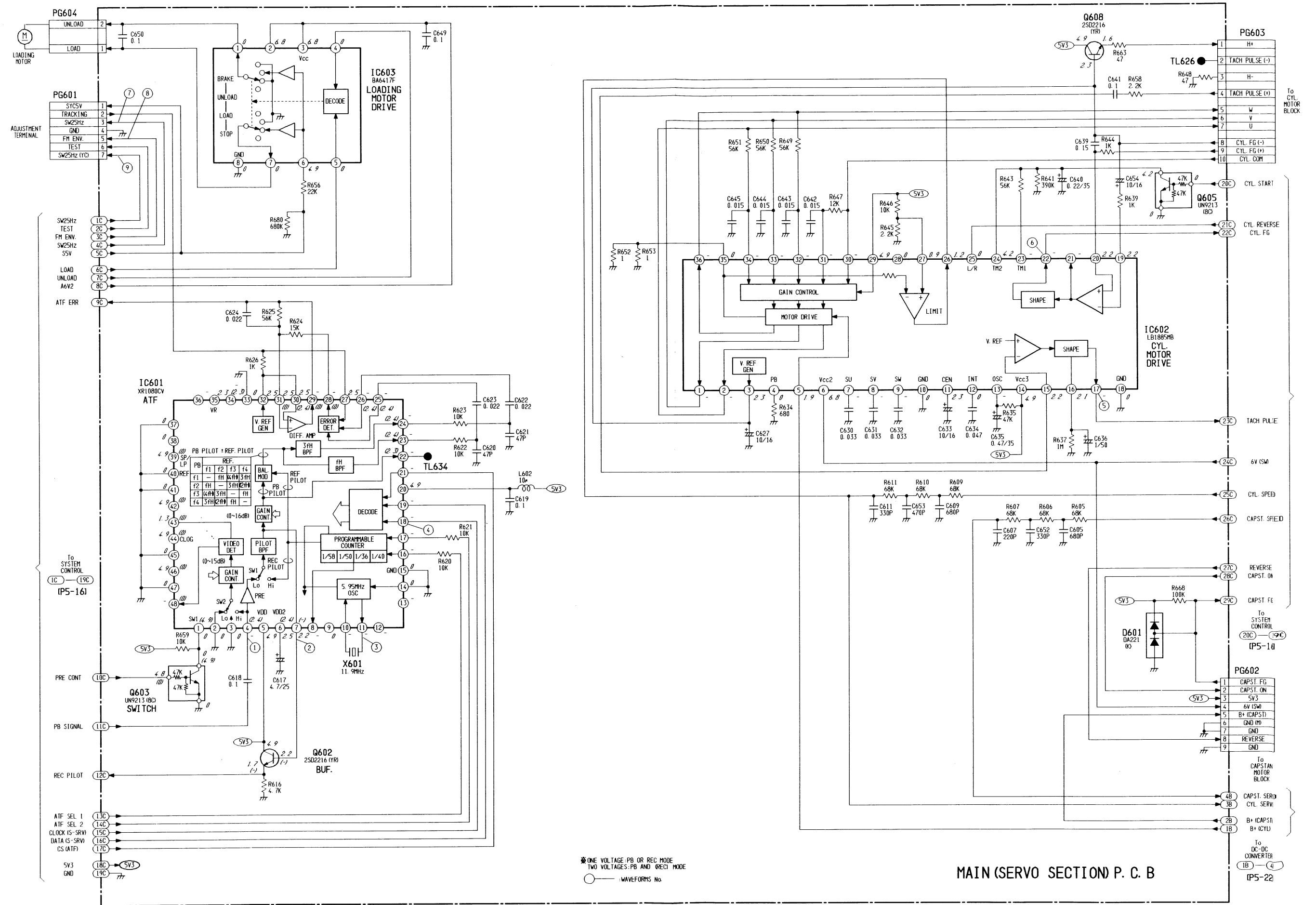
REC SW/BATT. SCHEMATIC DIAGRAM



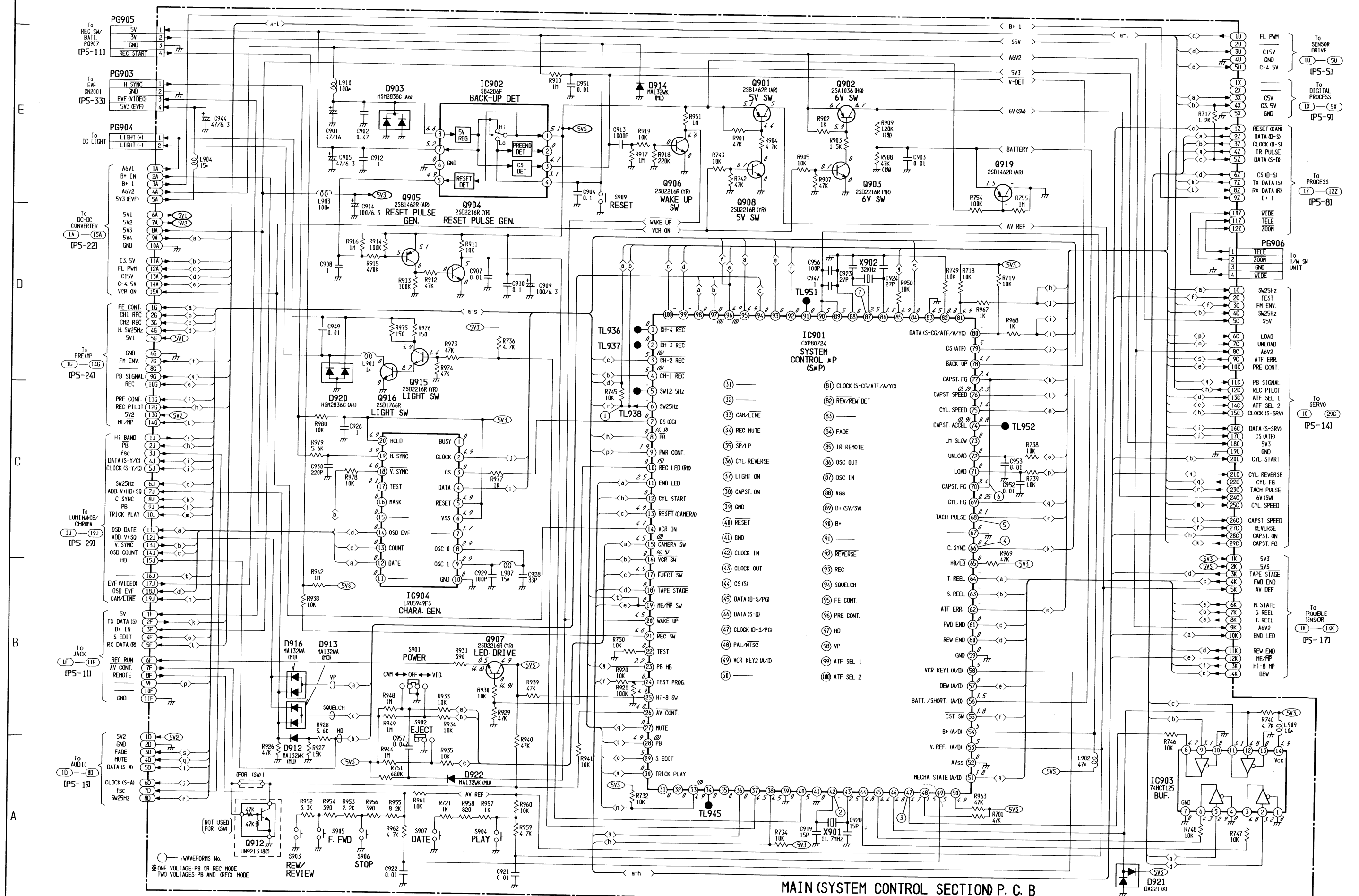
SERVO WAVEFORMS



SERVO (MAIN) SCHEMATIC DIAGRAM



SYSTEM CONTROL (MAIN) SCHEMATIC DIAGRAM



MAIN (SYSTEM CONTROL SECTION) P. C. B

1-A	IC901-6	4.2Up-p	1U/5.0msec.cm	REC/PLAY
2-A	IC901-42	4.7Up-p	1U/50.0nsec.cm	REC/PLAY
3-A	IC901-47	5.0Up-p	1U/20.0μ sec.cm	REC/PLAY
4-A	IC901-66	5.0Up-p	1U/20.0μ sec.cm	REC/PLAY
5-A	IC901-68	5.0Up-p	1U/10.0msec.cm	REC/PLAY
6-A	IC901-70	5.0Up-p	1U/200μ sec.cm	REC/PLAY
7-A	IC901-87	5.3Up-p	1U/20.0μ sec.cm	REC/PLAY

5V3 (1K) (5V3)

5V5 (2K)

TAPE STAGE (3K)

FWD END (4K)

AV REF (5K)

M STATE (6K)

S REEL (7K)

T REEL (8K)

A6V2 (9K)

END LED (10K)

REW END (11K)

ME/MP (12K)

Hi-B MP (13K)

DEW (14K)

PG901

PG1

S1

TAPE STAGE

Q1 PT4810F SUPPLY END SENSOR

Q3 SP1-315C SUPPLY REEL SENSOR

D1 PLT-462T3 END LED

Q4 PT4810F TAKE-UP END SENSOR

Q2 SP1-315C TAKE-UP REEL SENSOR

TROUBLE SENSOR [HTS9551A] P. C. B

MECHA. STATE SW S7

TAPE SELECT S5 S3 S4

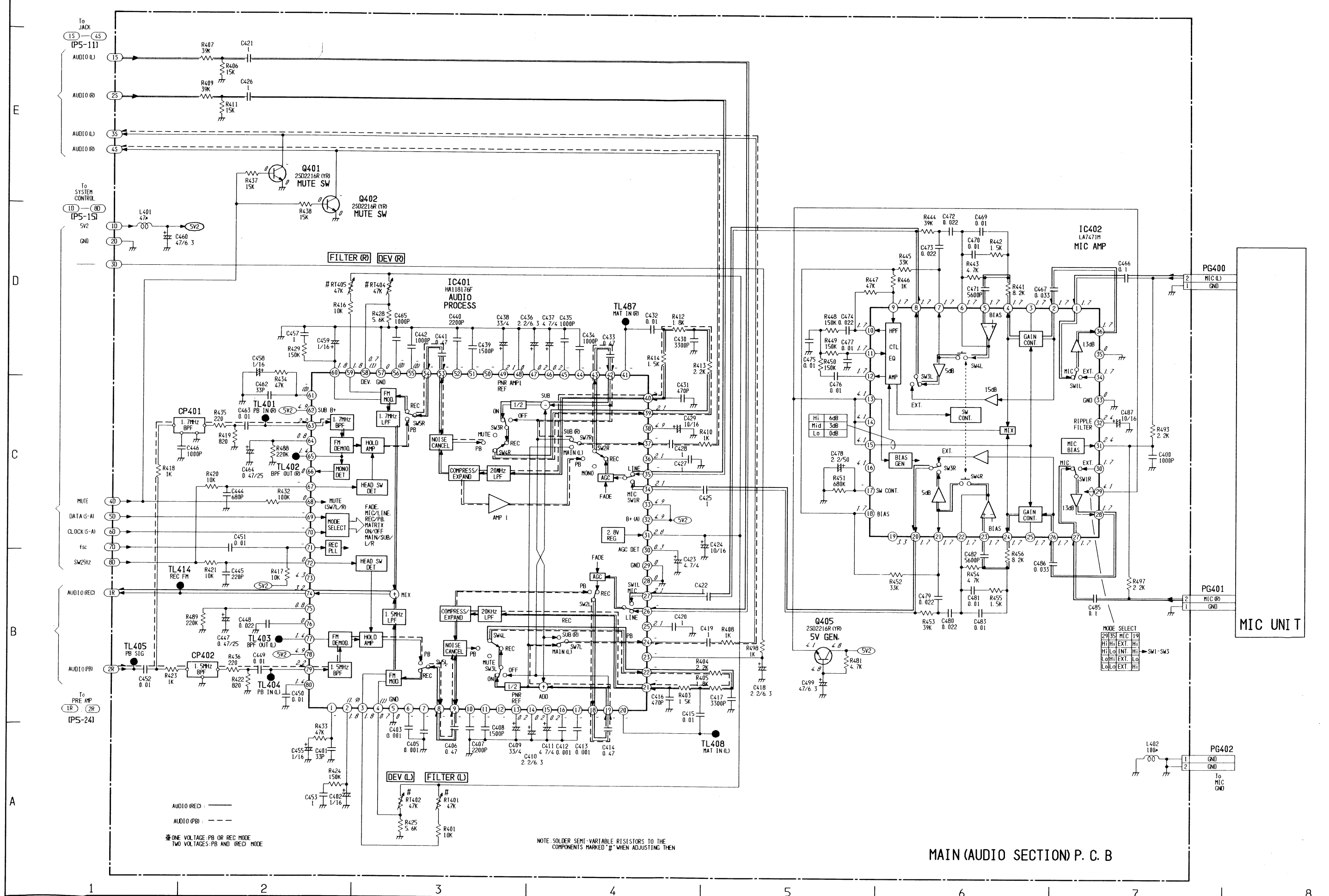
DEW SENSOR

PG902

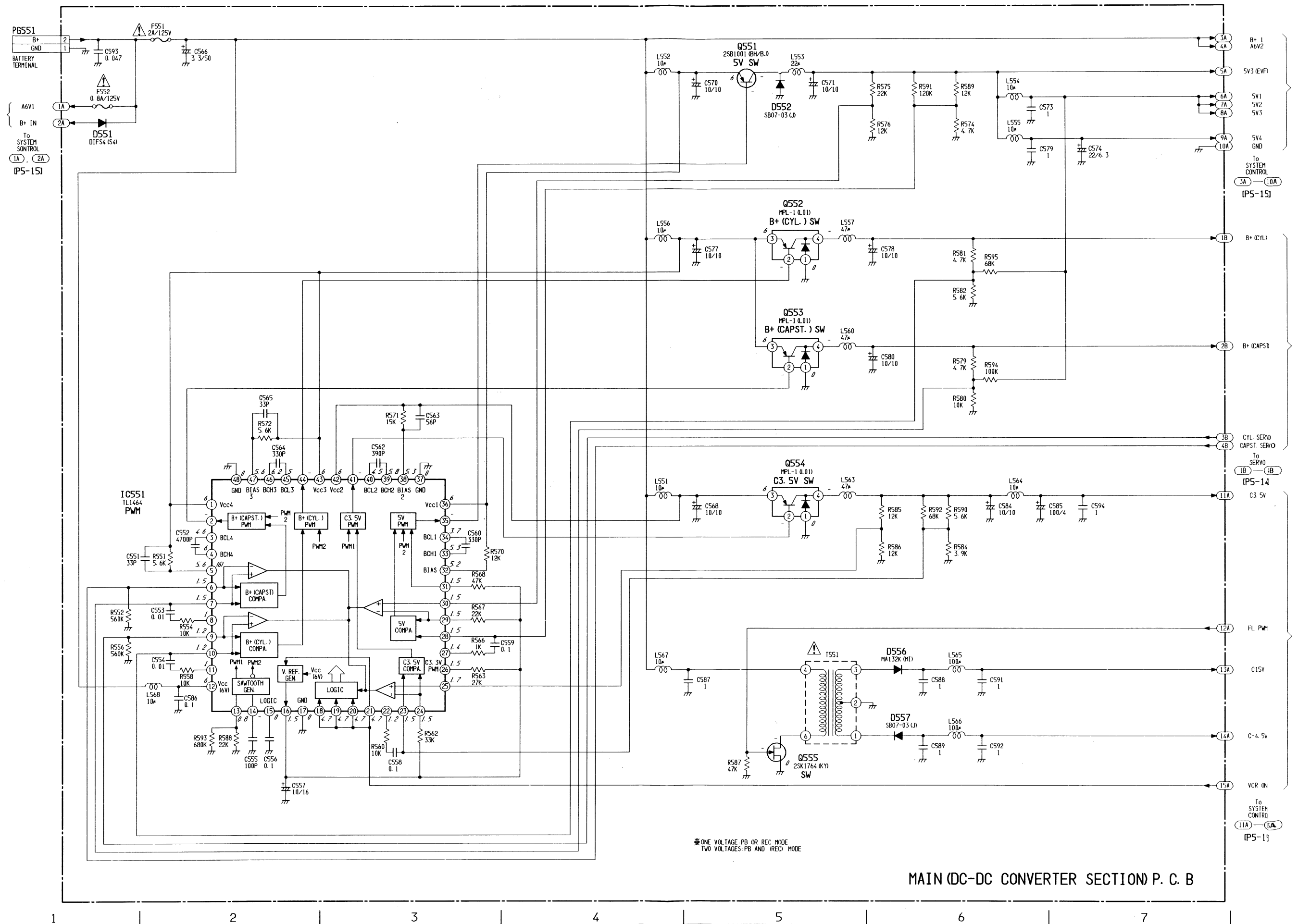
ONE VOLTAGE: PB OR REC MODE
TWO VOLTAGES: PB AND (REC) MODE

MAIN (TROUBLE SENSOR SECTION) P. C. B

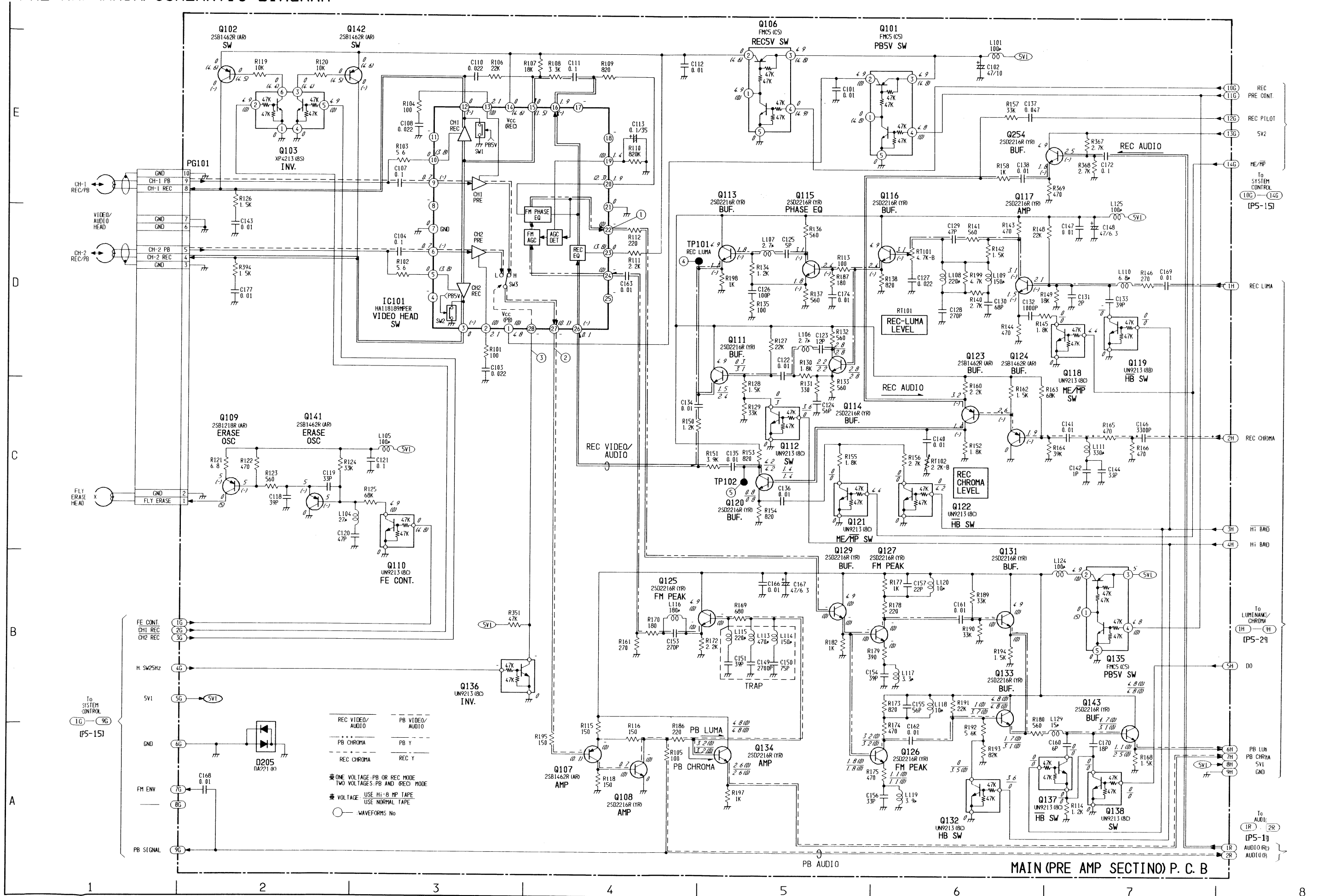
AUDIO (MAIN) SCHEMATIC DIAGRAM



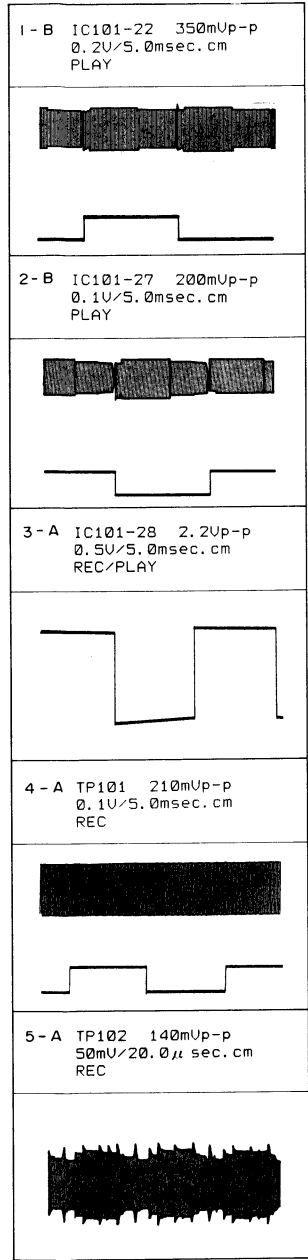
DC-DC CONVERTER (MAIN) SCHEMATIC DIAGRAM



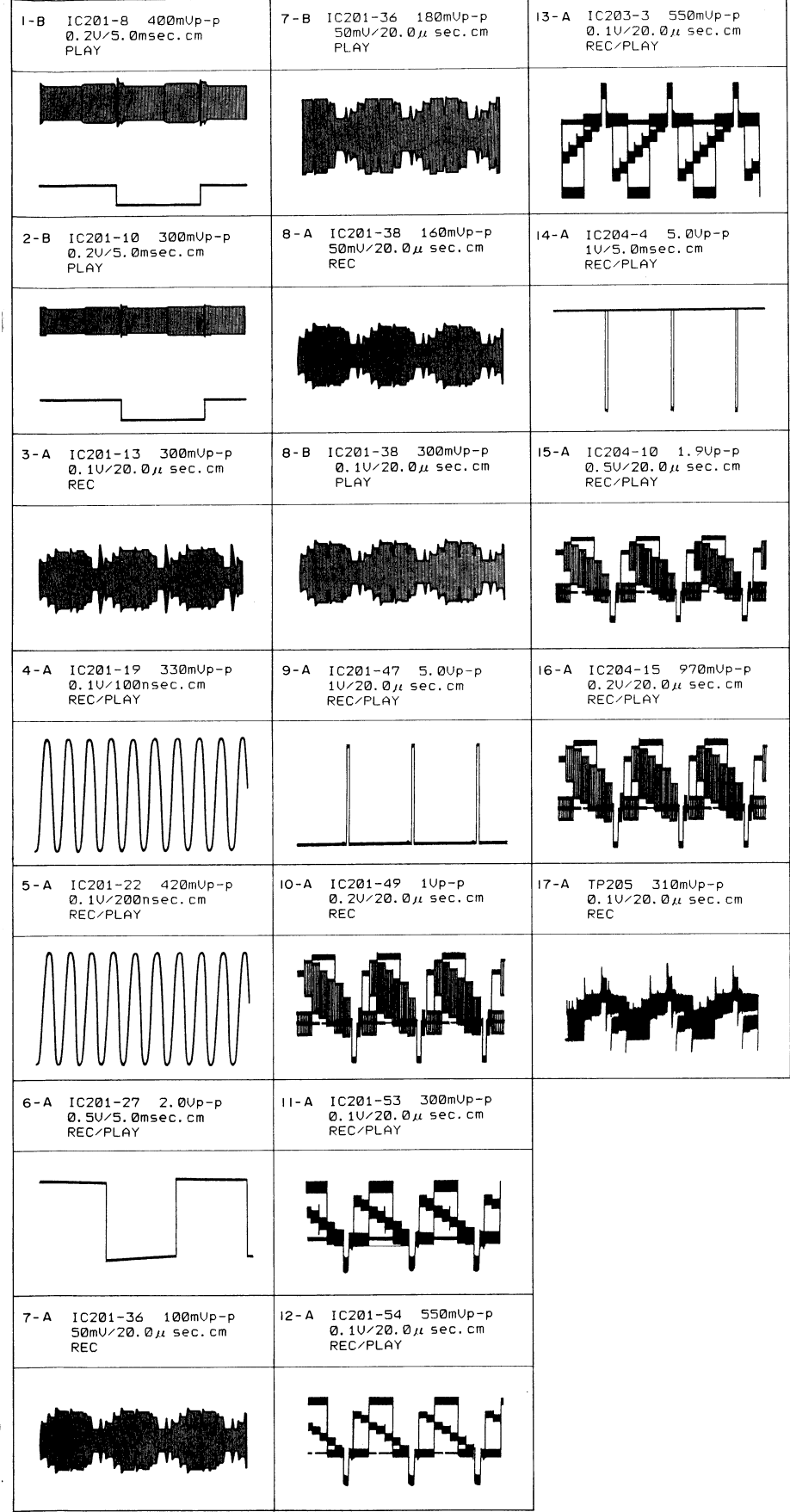
PRE AMP (MAIN) SCHEMATIC DIAGRAM



PRE AMP WAVEFORMS



LUMINANCE/CHROMA WAVEFORMS



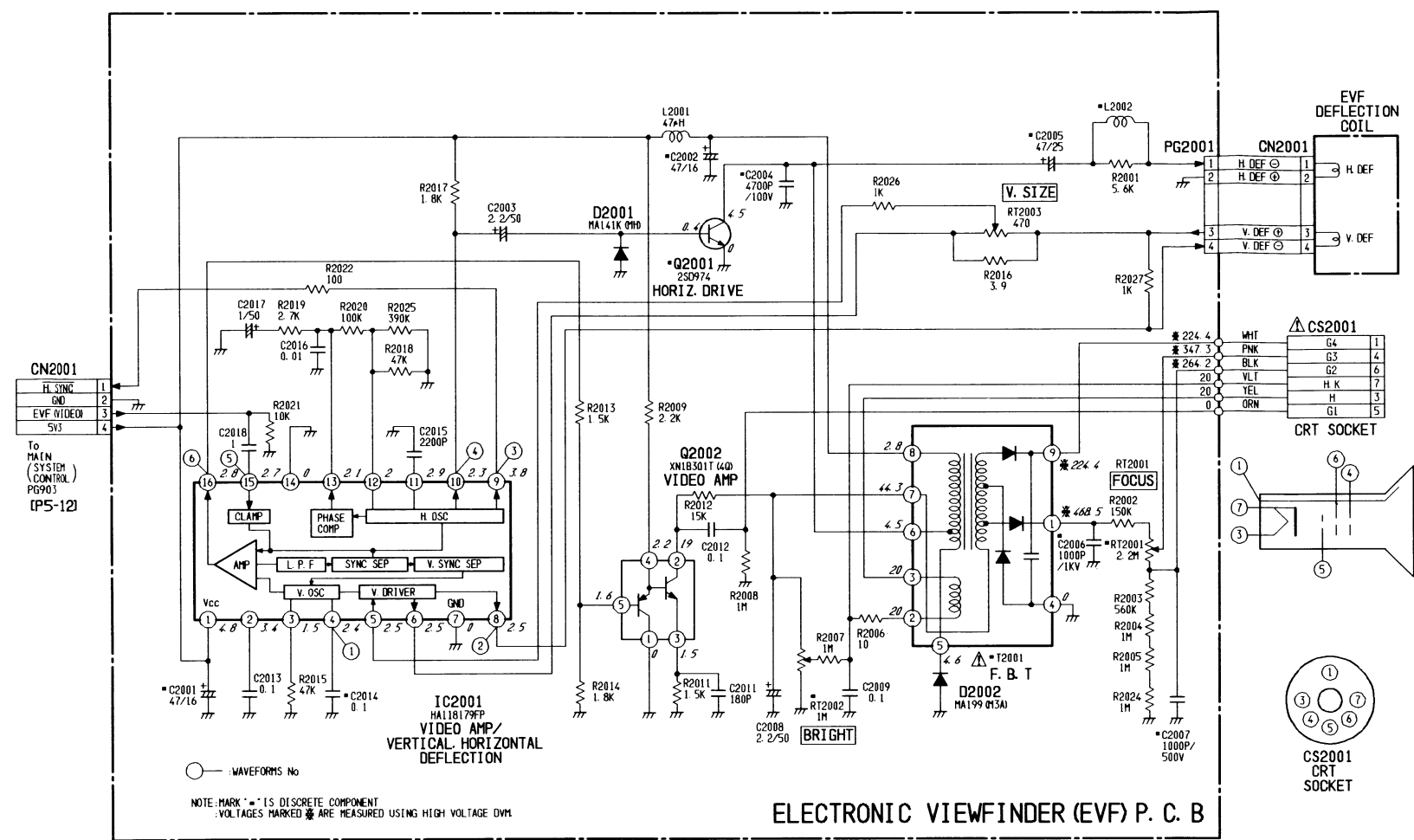

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REC/EE VIDEO
PB VIDEO
REC-Y
PB-Y
REC CHROMA
PB CHROMA

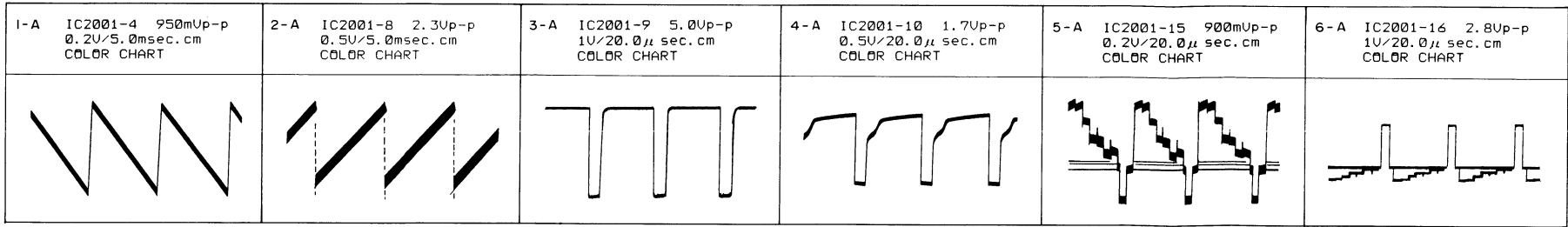
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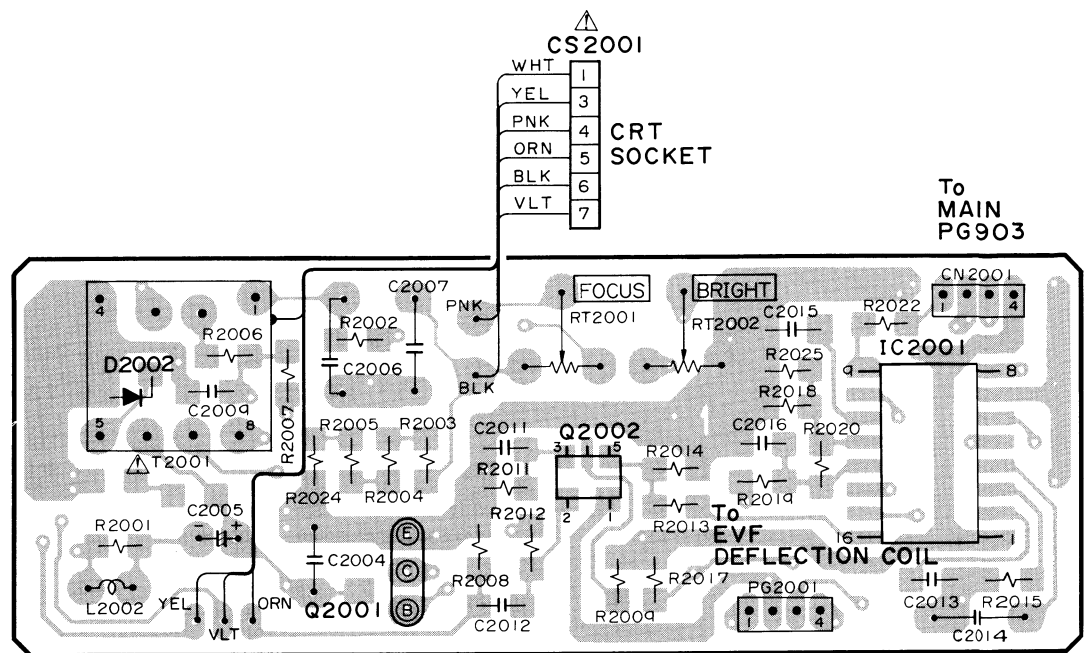
ELECTRONIC VIEWFINDER (EVF) SCHEMATIC DIAGRAM



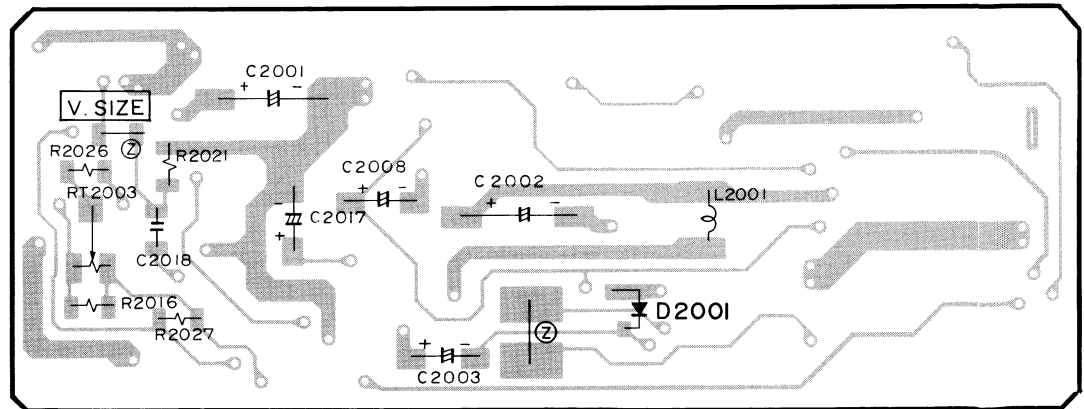
ELECTRONIC VIEWFINDER (EVF) WAVEFORMS



ELECTRONIC VIEWFINDER (EVF) CIRCUIT BOARD



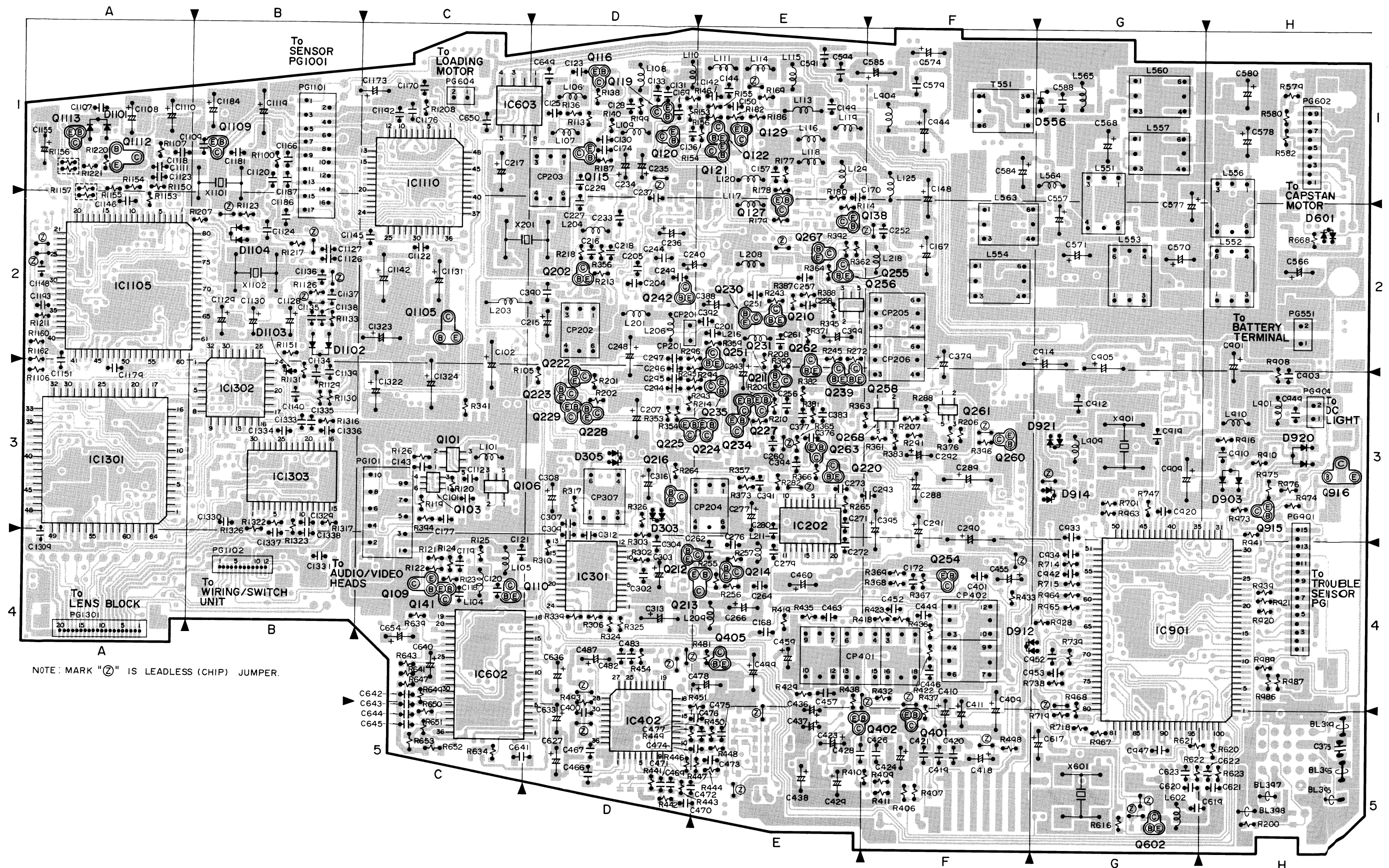
EVF (ELECTRONIC VIEWFINDER) - SIDE A -



EVF (ELECTRONIC VIEWFINDER) - SIDE B -

NOTE: MARK "Z" IS LEADLESS (CHIP) JUMPER.

MAIN CIRCUIT BOARD [SIDE-A]
[PATTERN No. 155135-6]



MAIN — SIDE A —
[PATTERN No.155135-6]

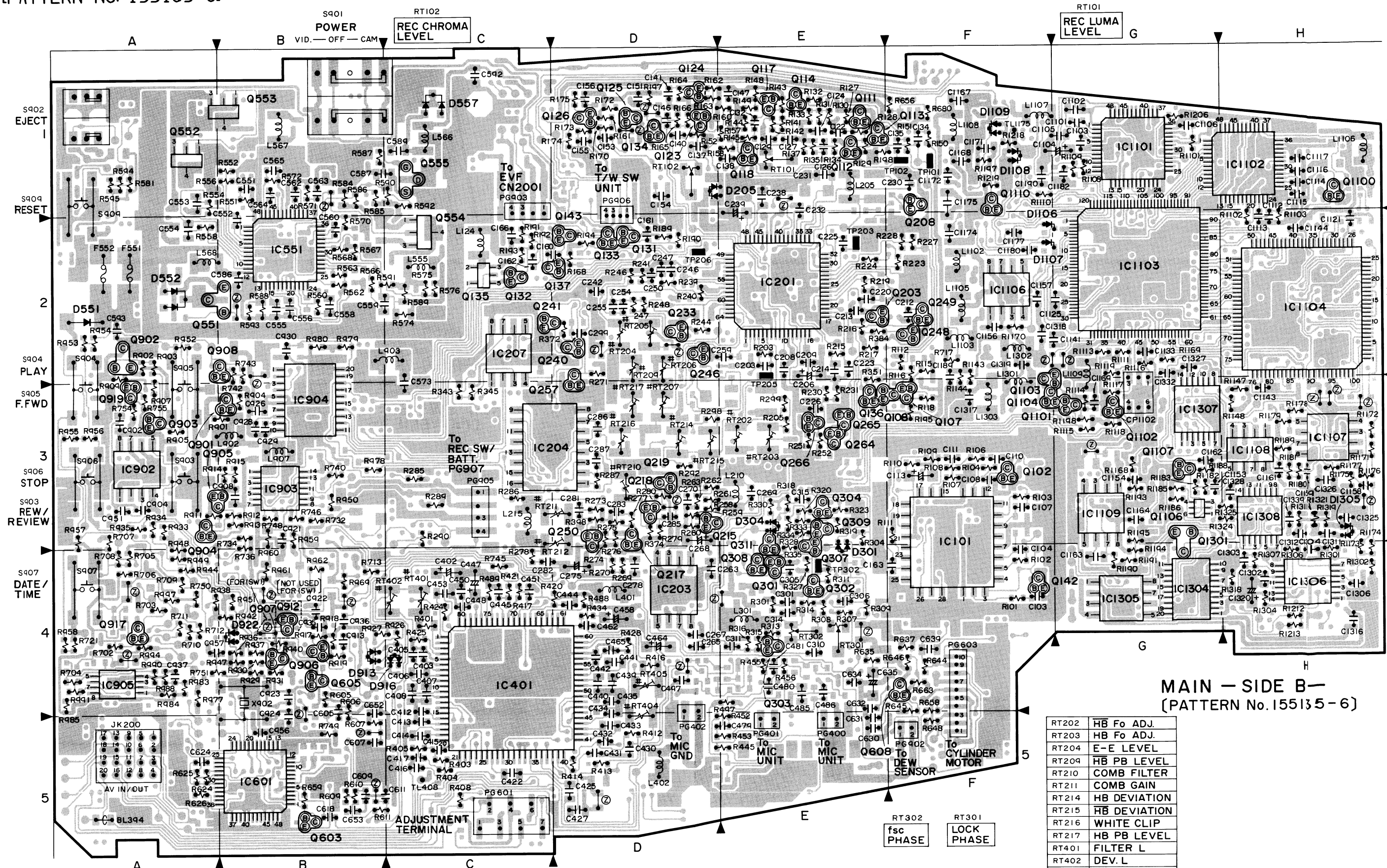
MAIN

5-37

MAIN

Symbol No.	Parts Location	Symbol No.	Parts Location	Symbol No.	Parts Location	Symbol No.	Parts Location	Symbol No.	Parts Location	Symbol No.	Parts Location	Symbol No.	Parts Location	Symbol No.	Parts Location	Symbol No.	Parts Location	Symbol No.	Parts Location	Symbol No.	Parts Location
Q219	B-3D	Q907	B-4B	R145	B-1E	R227	B-2F	R313	B-4E	R411	A-5F	R580	A-1H	R713	B-4B	R949	B-4A	R1144	B-3F	R1324	B-3H
Q220	A-3E	Q908	B-2A	R146	A-1D	R228	B-2F	R314	B-4E	R412	B-5D	R581	B-1A	R714	A-4G	R950	B-3B	R1147	B-3H	R1325	B-3H
Q222	A-3D	Q912	B-4B	R148	B-1E	R230	B-3E	R315	B-4E	R413	B-5D	R582	A-1H	R715	A-4G	R951	B-4B	R1148	B-3H	R1326	A-3B
Q223	A-3D	Q915	A-3H	R149	B-1E	R231	B-3E	R316	B-4E	R414	B-5D	R584	B-1B	R717	B-2F	R952	B-2A	R1150	A-1A	RT	
Q224	A-3E	Q916	A-3H	R150	B-1F	R239	B-2D	R317	A-3D	R416	B-4D	R585	B-1B	R718	A-5G	R953	B-2A	R1151	A-2B	RT101	B-1E
Q225	A-3D	Q917	B-4A	R151	B-1F	R240	B-2D	R318	B-3E	R417	B-4C	R586	B-1B	R719	A-5G	R954	B-2A	R1153	A-2A	RT102	B-1D
Q227	A-3E	Q919	B-3A	R152	B-1D	R241	B-2D	R319	B-3E	R418	A-4F	R587	B-1B	R721	B-4A	R955	B-3A	R1154	A-1A	RT202	B-3E
Q228	A-3D	Q1100	B-1H	R153	A-1D	R243	A-2E	R320	B-3E	R419	A-4E	R588	B-2B	R732	B-3B	R956	B-3A	R1155	A-1A	RT203	B-3E
Q229	A-3D	Q1101	B-3G	R154	A-1E	R244	B-2D	R323	B-3E	R420	B-4D	R589	B-2C	R734	B-3B	R957	B-3A	R1156	A-1A	RT204	B-2D
Q230	A-2E	Q1102	B-3G	R155	A-1E	R245	A-2E	R324	A-4D	R421	B-4C	R590	B-1C	R736	B-3B	R958	B-4A	R1157	A-2A	RT205	B-2D
Q231	A-3E	Q1103	B-3F	R156	A-1E	R246	B-2D	R325	A-4D	R422	A-4F	R591	B-2C	R738	A-4G	R959	B-3B	R1160	A-2A	RT206	B-2D
Q233	B-2D	Q1104	B-3F	R157	B-1E	R247	B-2D	R326	A-3D	R423	A-4F	R592	B-1C	R739	A-4G	R960	B-3B	R1162	A-3A	RT207	B-3D
Q234	A-3E	Q1105	A-2C	R158	B-1E	R248	B-2D	R327	B-4E	R424	B-4C	R593	B-2B	R740	B-3B	R961	B-4B	R1168	B-3G	RT209	B-2D
Q235	A-3E	Q1106	B-3G	R160	B-1E	R251	B-3E	R328	B-3E	R425	B-4C	R594	B-1A	R742	B-2B	R962	B-4B	R1169	B-2G	RT210	B-3D
Q239	A-3E	Q1107	B-3G	R161	B-1D	R252	B-3E	R330	B-3E	R428	B-4D	R595	B-1A	R743	B-2B	R963	A-3G	R1170	B-2F	RT211	B-3D
Q240	B-2D	Q1109	A-1B	R162	B-1D	R255	A-4E	R333	B-3E	R429	A-4E	R605	B-4B	R745	B-4C	R964	A-4G	R1171	B-3H	RT212	B-3D
Q241	B-2C	Q1110	B-1F	R163	B-1D	R256	A-4E	R334	B-3E	R432	A-4F	R606	B-4B	R746	B-3B	R965	A-4G	R1172	B-3H	RT214	B-3D
Q242	A-2D	Q1112	A-1A	R164	B-1D	R257	A-4E	R335	B-4E	R433	A-4F	R607	B-5B	R747	A-3G	R967	A-5G	R1173	B-4H	RT215	B-3D
Q246	B-2D	Q1113	A-1A	R165	B-1D	R258	B-3D	R339	A-4D	R434	B-4D	R609	B-5B	R748	B-3B	R968	A-4G	R1174	B-4H	RT216	B-3D
Q248	B-2F	Q1301	B-4G	R166	B-1D	R259	B-3D	R341	A-3C	R435	A-4E	R610	B-5B	R749	B-5B	R969	B-4B	R1175	B-3H	RT217	B-3D
Q249	B-2F	R	R101	R168	B-2D	R260	B-3D	R343	B-3C	R436	A-4F	R611	B-5B	R750	B-4A	R973	A-3H	R1176	B-3H	RT301	B-4E
Q250	B-3D			R169	A-1E	R261	B-3D	R345	B-3C	R437	A-5F	R616	A-5G	R751	B-4A	R974	A-3H	R1177	B-3H	RT302	B-4E
Q251	A-2E	R102	B-4F	R170	B-1D	R262	B-3D	R351	B-2E	R438	A-4E	R620	A-5H	R754	B-3A	R975	A-3H	R1178	B-3H	RT401	B-4C
Q254	A-4F	R103	B-3F	R172	B-1D	R263	B-3D	R353	A-3D	R441	A-5D	R621	A-5G	R755	B-3A	R976	A-3H	R1179	B-3H	RT402	B-4C
Q255	A-2E	R104	B-3F	R173	B-1D	R264	A-3D	R354	A-3D	R442	A-5D	R622	A-5G	R901	B-3B	R977	B-4A	R1180	B-3H	RT404	B-5D
Q256	A-2E	R105	A-3D	R174	B-1D	R265	A-3E	R356	A-2D	R443	A-5D	R623	A-5H	R902	B-2A	R978	B-3B	R1181	B-3H	RT405	B-4D
Q257	B-3D	R106	B-3F	R175	B-1D	R269	B-4D	R357	A-3E	R444	A-5E	R624	B-5A	R903	B-2A	R979	B-2B	R1182	B-3G	S	
Q258	A-3E	R107	B-3F	R177	A-1E	R270	B-4D	R359	A-2E	R445	B-5E	R625	B-5A	R904	B-3B	R980	B-2B	R1183	B-3G	S901	B-1B
Q260	A-3F	R108	B-3F	R178	A-1E	R271	B-2D	R361	A-3F	R446	A-5D	R626	B-5A	R905	B-3A	R983	B-4A	R1185	B-3G	S902	B-1A
Q261	A-3F	R109	B-3F	R179	A-2E	R272	A-2E	R362	A-2E	R447	A-5E	R634	A-5C	R907	B-3A	R984	B-4A	R1186	B-3G	S903	B-3A
Q262	A-2E	R110	B-3F	R180	A-1E	R273	B-3D	R363	A-3E	R448	A-5E	R635	B-4E	R908	A-3H	R985	B-4A	R1188	B-3G	S904	B-2A
Q263	A-3E	R111	B-3F	R182	A-1E	R274	B-3D	R364	A-2E	R449	A-5D	R637	B-4F	R909	B-2A	R986	A-4H	R1189	B-3H	S905	B-2A
Q264	B-3E	R112	B-2F	R186	A-1E	R275	B-3D	R365	A-3E	R450	A-5E	R639	A-4C	R910	A-3H	R987	A-4H	R1190	B-4G	S906	B-3A
Q265	B-3E	R113	A-1D	R187	A-1D	R276	B-3D	R366	A-3E	R451	A-5E	R641	A-4C	R911	B-3A	R988	B-4A	R1191	B-4G	S907	B-4A
Q266	B-3E	R114	A-2E	R189	B-2D	R277	B-3D	R367	A-4F	R452	B-5E	R643	A-4C	R912	B-3B	R989	A-4H	R1193	B-3G	S909	B-1A
Q267	A-2E	R115	B-2F	R190	B-2D	R278	B-4C	R368	A-4F	R453	B-5E	R644	B-4F	R913	B-3B	R990	B-4A	R1194	B-4G	T	
Q268	A-3F	R116	B-2F	R191	B-2C	R279	B-3D	R369	A-4F	R454	A-4D	R645	B-4F	R914	B-3B	R991	B-4A	R1195	B-3G	T551	A-1F
Q301	B-4E	R118	B-3F	R192	B-2C	R280	B-3D	R371	A-2E	R455	B-4E	R646	B-4F	R915	B-3B	R994	B-4A	R1197	B-1F	TL	
Q302	B-4E	R119	A-3C	R193	B-2C	R282	A-3E	R372	B-2D	R456	B-4E	R647	A-4C	R916	A-3H	R997	B-4A	R1198	B-3G	TL408	B-5C
Q303	B-4E	R120	A-3C	R194	B-2D	R285	B-3C	R373	A-3E	R481	A-4E	R648	B-5F	R917	B-4B	R1100	A-1B	R1206	B-1G	TL1175	B-1F
Q304	B-3E	R121	A-4C	R195	B-3F	R286	B-3C	R374	B-3D	R488	B-4D	R649	A-4C	R918	B-4B	R1101	B-1G	R1207	A-2B	TP	
Q307	B-4E	R122	A-4C	R197	B-1D	R287	B-3D	R376	A-3F	R489	B-4C	R650	A-5C	R919	B-4B	R1102	B-2H	R1208	A-1C	TP101	B-1F
Q308	B-4E	R123	A-4C	R198	B-1E	R288	A-3F	R381	A-3E	R493	A-4D	R651	A-5C	R920	A-4H	R1103	B-2H	R1211	A-2A	TP102	B-1F
Q309	B-3E	R124	A-4C	R199	A-1D	R289	B-3C	R382	A-3E	R497	B-4E	R652	A-5C	R921	A-4H	R1106	A-3A	R1212	B-4H	TP203	B-2E
Q311	B-3E	R125	A-4C	R200	A-5H	R290	B-3C	R383	A-3F	R498	A-5F	R653	A-5C	R926	B-4C	R1107	A-1A	R1213	B-4H	TP205	B-2E
Q401	A-5F	R126	A-3C	R201	A-3D	R291	A-3F	R384	B-2E	R551	B-1B	R656	B-1F	R927	B-4B	R1108	B-1G	R1217	A-2B	TP206	B-2D
Q402	A-5E	R127	B-1E	R202	A-3D	R292	B-3D	R387	A-2E	R552	B-1B	R658	B-4F	R928	A-4G	R1109	B-1G	R1218	B-1F	TP302	B-4E
Q405	A-4E	R128	B-1E	R203	B-2E	R293	A-3D	R388	A-2E	R554	B-1A	R659	B-5B	R929	B-4B	R1110	B-1F	R1219	B-1F	X	
Q551	B-2A	R129	B-1E	R205	B-3E	R294	A-3D	R390	A-2E	R556	B-1B	R663	B-4F	R930	B-4B	R1111	B-2G	R1220	A-1A	X201	A-2C
Q552	B-1A	R130	B-1E	R206	A-3F	R295	A-3D	R392	A-2E	R558	B-2A	R668	A-2H	R931	B-4B	R1113	B-2G	R1221	A-1A	X601	A-5G
Q553	B-1B	R131	B-1E	R207	A-3F	R296	A-2D	R394	A-3C	R560	B-2B	R680	B-1F	R933	B-3A	R1114	B-3G	R1301	B-4H	X901	A-3G
Q554	B-2C	R132	B-1E	R208	A-2E	R298	B-3D	R395	A-2E	R562	B-2B	R701	A-3G	R934	B-3A	R1115	B-3G	R1302	B-4H	X902	B-4B
Q555	B-1C	R133	B-1E	R209	A-3E	R299	B-3E	R396	A-3F	R563	B-2B	R702	B-4A	R935	B-3A	R1116	B-2G	R1304	B-4H	X1101	A-1B
Q602	A-5G	R134	B-1E	R210	A-3E	R301	B-4E	R398	B-3D	R566	B-2B	R703	B-4A	R936	B-4B	R1117	B-3G	R1306	B-4H	X1102	A-2B
Q603	B-5B	R135	B-1E	R213	A-2D	R302	A-4D	R401	B-4C	R567	B-2B	R704	B-4A	R937	B-4B	R1118	B-3G	R1307	B-4H		
Q605	B-4B	R136	A-1D	R214	A-3D	R303	A-4D	R403	B-5C	R568	B-2B	R705	B-4A	R938	B-4A	R1119	B-2G	R1311	B-3H		
Q608	B-4F	R137	B-1E	R215	B-2E	R304	B-3E	R404	B-5C	R570	B-2B	R706	B-4A	R939	A-4H	R1123	A-2B	R1316	A-3B		
Q901	B-3B	R138	A-1D	R216	B-2E	R306	A-4D	R405	B-5C	R571	B-1B	R707	B-3A	R940	B-4B	R1126	A-2B	R1317	A-3B		
Q902	B-2A	R140	A-1D	R217	B-2E	R307	B-4E	R406	A-5F	R572	B-1B	R708	B-4A	R941	A-3H	R1129	A-3B	R1318	B-4H		
Q903	B-3A	R141	B-1E	R218	A-2D	R308	B-4E	R407	A-5F	R574	B-2C	R709	B-4A	R942	B-4B	R1130	A-3B	R1319	B-3H		
Q904	B-3A	R142	B-1E	R219	B-2E	R309	B-4E	R408	B-5C	R575	B-2C	R710	B-4A	R944	B-4A	R1131	A-3B	R1321	B-3H		
Q905	B-3A	R143	B-1E	R223	B-2F	R310	A-4D	R409	A-5F	R576	B-2C	R711	B-4A	R947	B-4B	R1133	A-2B	R1322	A-3B		
Q906	B-4B	R144	B-1E	R224	B-2E	R311	B-4E	R410	A-5F	R579	A-1H	R712	B-4A	R948	B-4A	R1143	B-2F	R1323	A-3B		

MAIN CIRCUIT BOARD (SIDE-B) (PATTERN No. 155135-6)

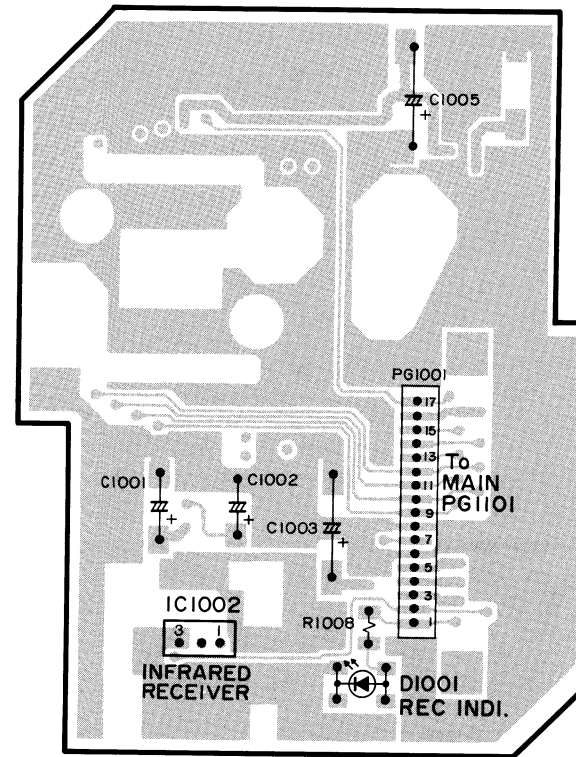


NOTE: MARK "Z" IS LEADLESS (CHIP) JUMPER.
: SOLDER SEMI-VARIABLE RESISTORS TO THE COMPONENTS
MARKED "H" WHEN ADJUSTING THEM.

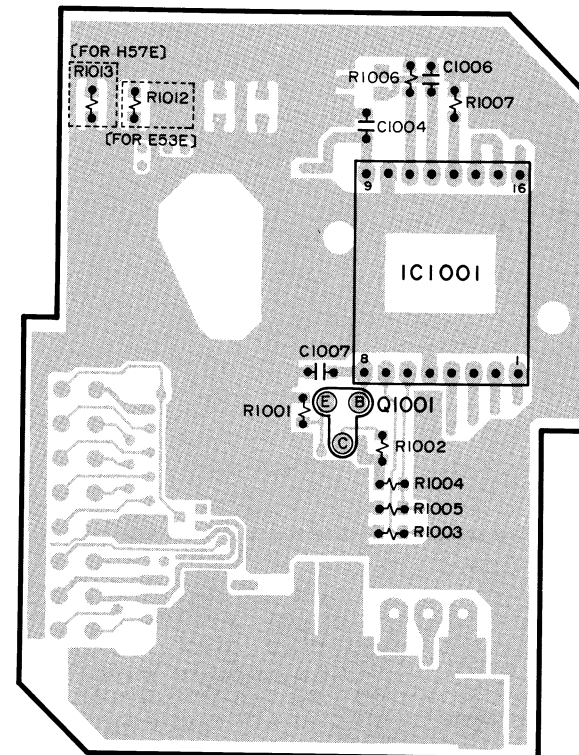
MAIN - SIDE B -
(PATTERN No. 155135-6)

RT202	HB Fo ADJ.
RT203	HB Fo ADJ.
RT204	E-E LEVEL
RT209	HB PB LEVEL
RT210	COMB FILTER
RT211	COMB GAIN
RT214	HB DEVIATION
RT215	HB DEVIATION
RT216	WHITE CLIP
RT217	HB PB LEVEL
RT401	FILTER L
RT402	DEV. L
RT404	DEV. R
RT405	FILTER R

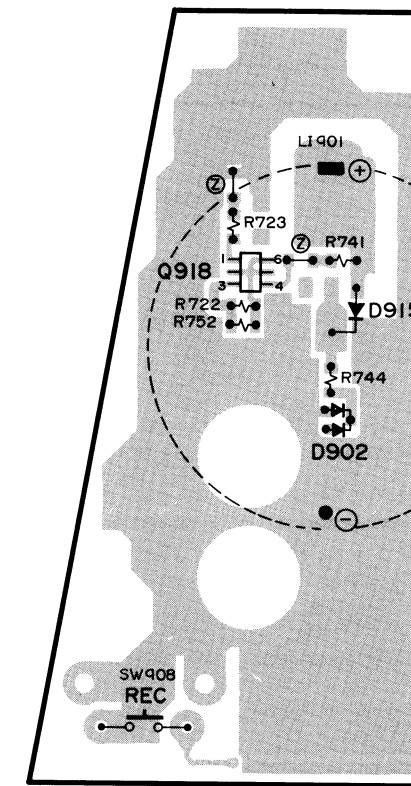
SENSOR, TROUBLE SENSOR, REC SW/BATT. CIRCUIT BOARDS



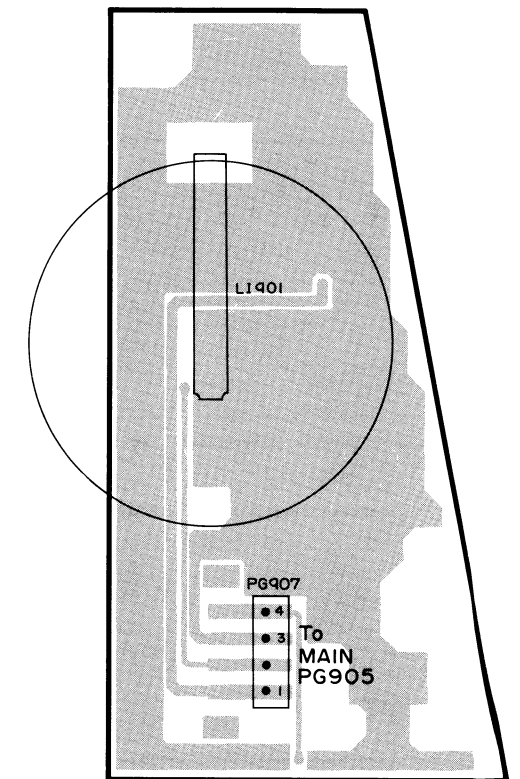
SENSOR - SIDE A-
(PATTERN No.155135-5,6)



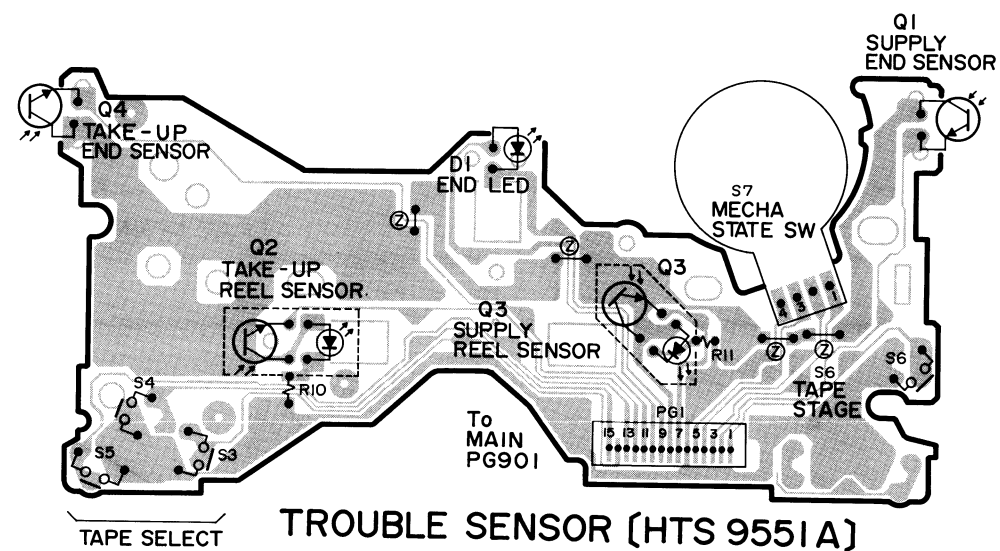
SENSOR - SIDE B -



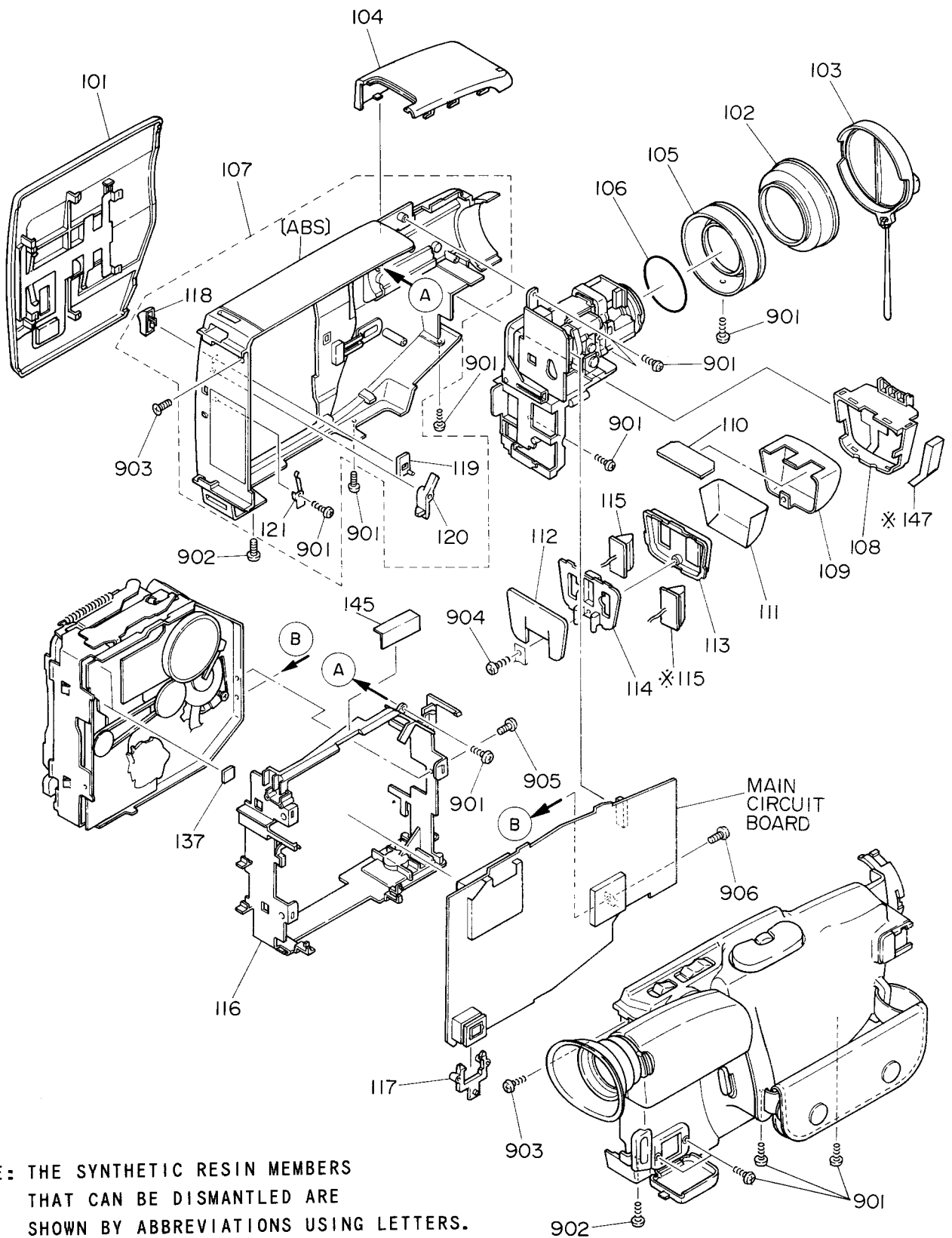
REC SW / BATT.-SIDE A-
[PATTERN No. 155135-5,6]



REC SW/BATT.-SIDE B-

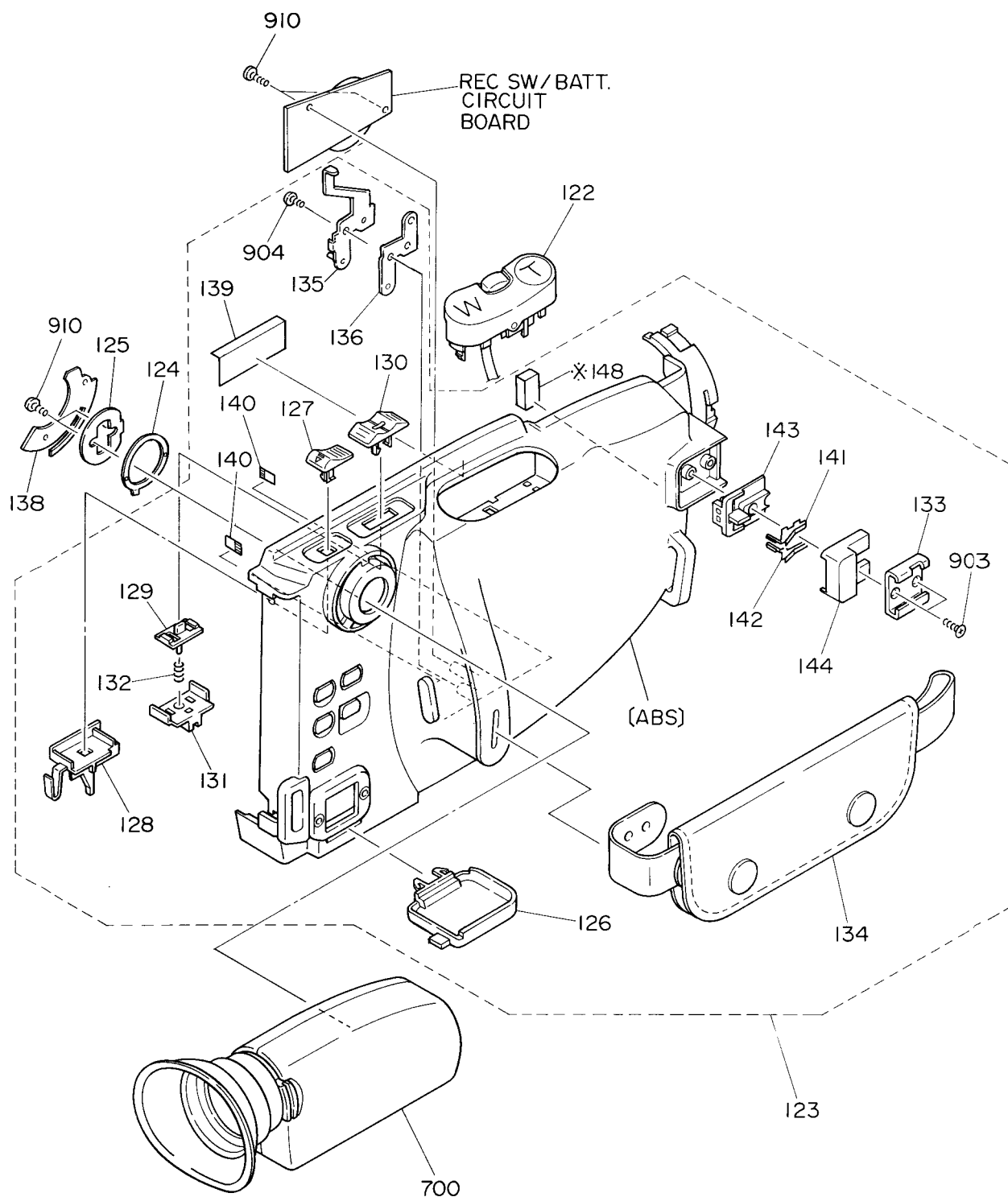


TROUBLE SENSOR [HTS 9551A]

EXPLODED VIEWS**CABINET SECTION 1 (LEFT CASE SIDE AND VCR BLOCK)**

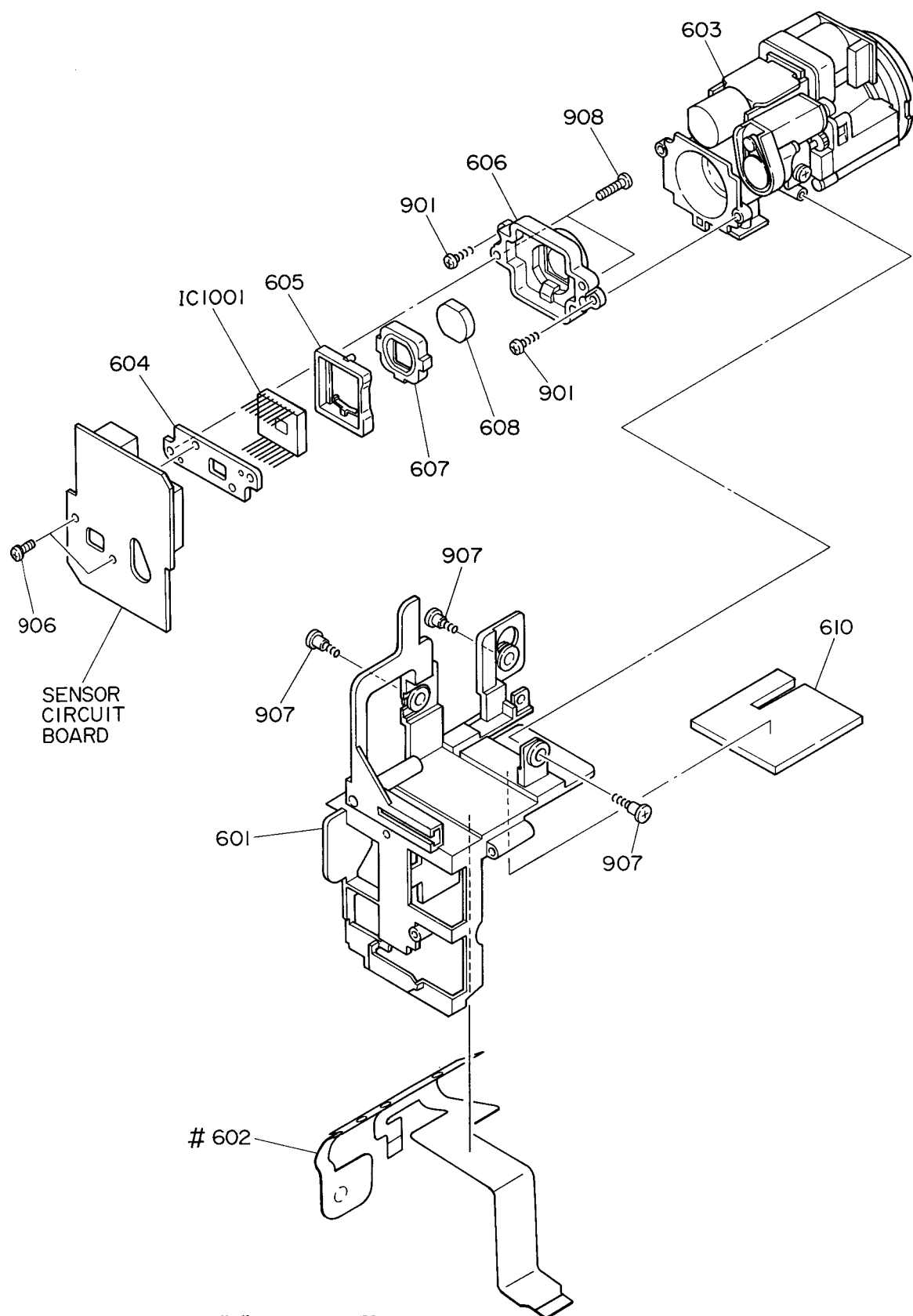
NOTE: THE SYNTHETIC RESIN MEMBERS THAT CAN BE DISMANTLED ARE SHOWN BY ABBREVIATIONS USING LETTERS. THE PARTS MARKED "X" ARE APPLIED TO THE PRODUCTS WHICH HAVE THE STEREO AUDIO FUNCTION.

CABINET SECTION 2 (RIGHT CASE SIDE)



NOTE: THE SYNTHETIC RESIN MEMBERS THAT CAN BE DISMANTLED ARE SHOWN BY ABBREVIATIONS USING LETTERS. THE PARTS MARKED "*" ARE APPLIED TO THE PRODUCTS WHICH HAVE THE STEREO AUDIO FUNCTION.

CAMERA BLOCK SECTION



NOTE: THE PARTS MARKED "#" ARE APPLIED TO THE PRODUCTS WHICH HAVE THE FADE AND MANUAL FOCUS FUNCTIONS.

CHASSIS SECTION

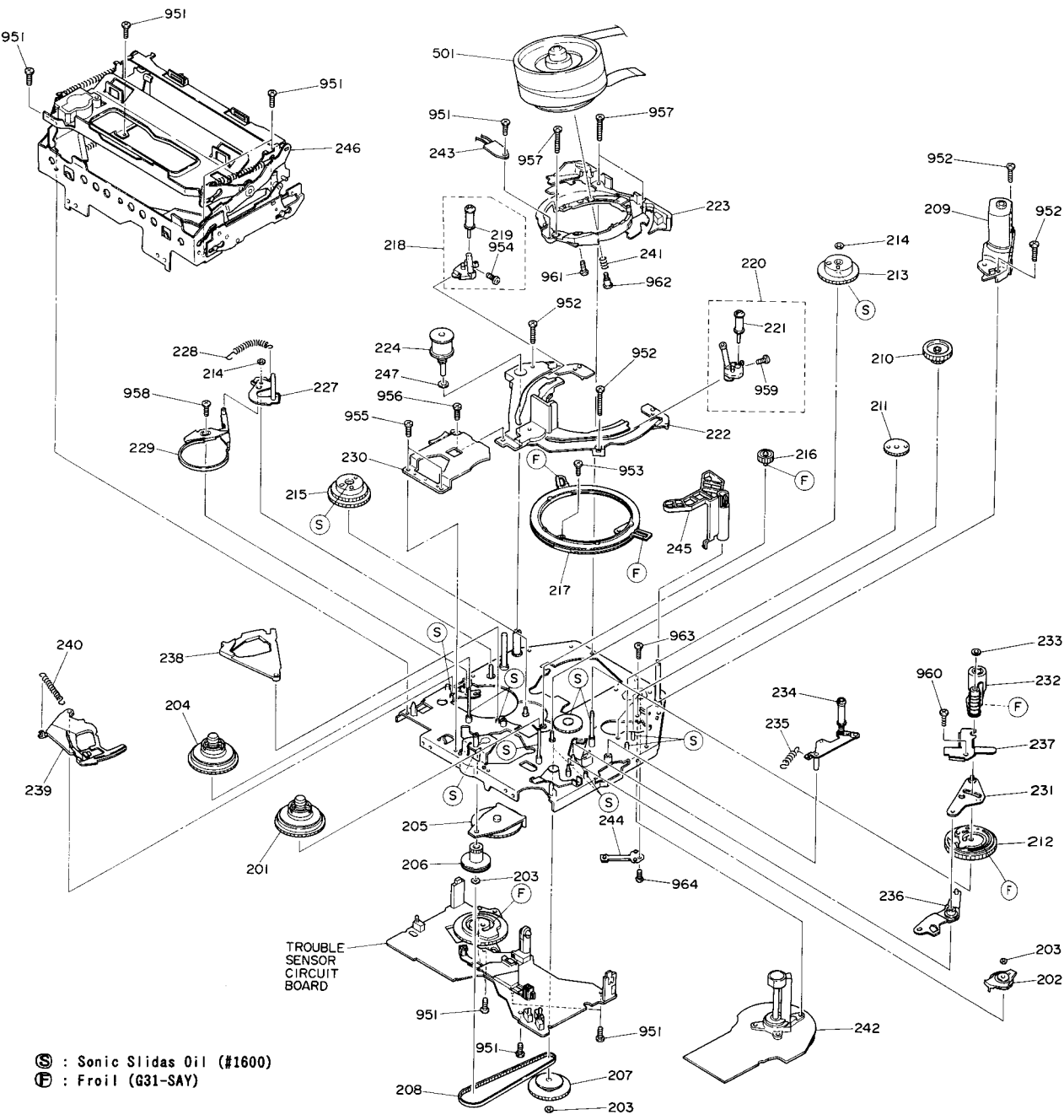
E

D

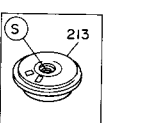
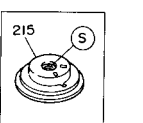
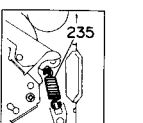
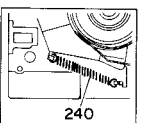
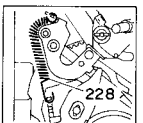
C

B

A



S : Sonic Slidas Oil (#1600)
F : Froil (G31-SAY)



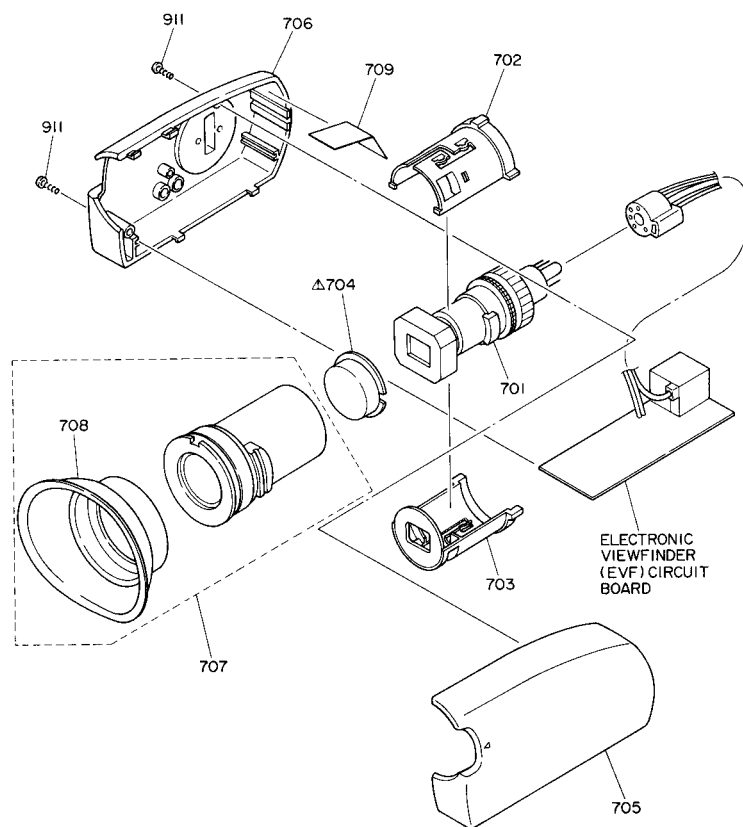
1

2

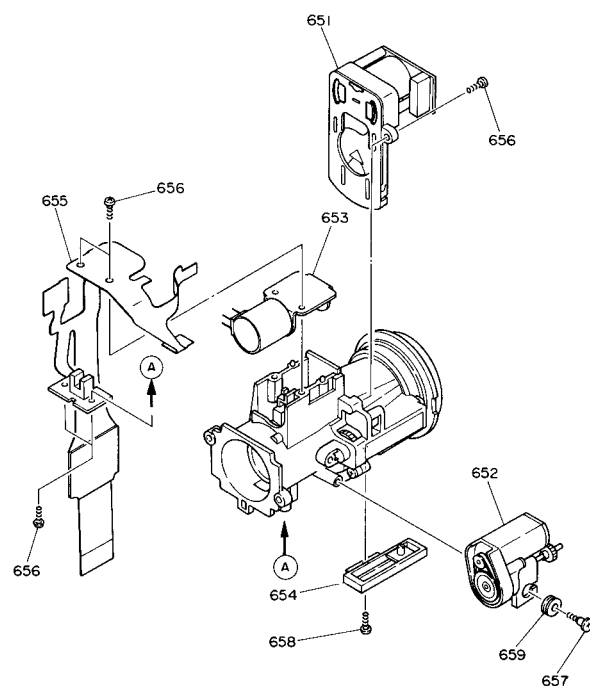
3

4

ELECTRONIC VIEWFINDER (EVF) SECTION



LENS BLOCK SECTION



REPLACEMENT PARTSLIST M820/ M870

CABINET PARTS SECTION

101	4822 443 41311	LID,CASSETTE	M820/01
101	4822 443 41312	LID,CASSETTE	M870/01
102	4822 532 52544	RING,LENS	
103	4822 462 71966	CAP,HOOD	
104	4822 450 62152	WINDOW,IR	
105	4822 532 40233	RING	
106	4822 532 52545	RING,LENS	
107	4822 432 60831	CASE,SIDE(L)	M870/01
107	4822 432 60817	CASE,SIDE(L)	M820/01
108	4822 432 60832	CASE, MICROPHONE	M870/01
108	4822 432 60815	CASE, MICROPHONE	M820/01
109	4822 432 60834	METAL	M870/01
109	4822 432 60819	METAL	M820/01
110	4822 466 62432	CUSHION	
111	4822 466 62429	CUSHION	
112	4822 466 62431	CUSHION	
113	4822 256 92125	HOLDER	M870/01
113	4822 256 92118	HOLDER	M820/01
114	4822 256 92119	HOLDER	
115	4822 242 30288	MICROPHONE	
116	4822 464 51004	FRAME	
117	4822 403 71002	HOLDER	
118	4822 410 62928	KNOB,EJECT	
119	4822 403 71001	HOLDER	
120	4822 403 71003	LEVER,EJECT	
121	4822 492 33423	SPRING	
122	4822 277 11441	SWITCH,T/W	
123	4822 432 60833	SIDE,CASE(R)	M870/01
123	4822 432 60816	SIDE,CASE(R)	M820/01
124	4822 492 71425	SPRING	
125	4822 532 12263	STOPPER	
126	4822 432 60818	COVER, CONNECTOR	
127	4822 410 62929	KNOB,EJECT	
128	4822 256 92121	HOLDER	
129	4822 410 62932	KNOB,POWER	
130	4822 256 92123	HOLDER	
131	4822 403 71018	HOLDER	
132	4822 492 52377	SPRING	
133	4822 403 71019	SHOE	
134	4822 498 40599	STRAP,HAND	
135	4822 403 71016	PLATE,STRAP	
136	4822 403 71004	SHEET	
137	4822 462 71967	SPACER	
138	4822 403 71005	SHEET,EVF	
139	4822 466 62433	SHEET	
141	4822 268 10344	TERMINAL L	
142	4822 268 10345	TERMINAL R	
143	4822 256 92122	HOLDER	
144	4822 432 60823	COVER,TERMINAL	
145	4822 466 93308	CUSHION	
147	4822 466 93309	CUSHION	

CHASSIS SECTION

201	4822 528 10894	REEL DISK,TAKE-UP	
202	4822 522 33409	GEAR	
203	4822 532 52548	WASHER	
204	4822 528 10895	REEL DISK,SUPPLY	
205	4822 522 33404	GEAR,IDLER	
206	4822 522 33412	GEAR	
207	4822 522 33407	GEAR	
208	4822 358 31273	BELT	
209	4822 361 21686	LOADING MOTOR BLOCK M870/01	
209	4822 361 21681	LOADING MOTOR BLOCK M820/01	
210	4822 522 33403	GEAR	
211	4822 522 33408	GEAR	
212	4822 522 33413	GEAR	
213	4822 522 33406	GEAR	
214	4822 532 52551	WASHER	
215	4822 522 33405	GEAR	
216	4822 522 33411	GEAR	
217	4822 532 12264	RING,LOADING	

218	4822 403 71014	BASE,GUIDE ROLLER(I)	
219	4822 528 70837	GUIDE ROLLER	
220	4822 403 71015	BASE,GUIDE ROLLER(O)	
221	4822 528 70836	GUIDE ROLLER	
222	4822 403 71006	PLATE,GUIDE	
223	4822 464 51006	BASE,CYLINDER	
224	4822 528 81507	IMPEDANCE ROLLER	
227	4822 403 71013	ARM,TENSION	
228	4822 492 33427	SPRING	
229	4822 466 40651	BAND,TENSION	
230	4822 432 60829	COVER,IDLER	
231	4822 403 71017	PLATE,CAM	
232	4822 403 71008	ARM,PRESSURE ROLLER	
233	4822 532 52547	WASHER	
234	4822 403 71012	ARM,PULL OUT	
235	4822 492 33424	SPRING	
236	4822 403 71007	LEVER	
237	4822 403 71011	PLATE	
238	4822 403 71021	PLATE	
239	4822 403 10312	BRAKE	
240	4822 492 33426	SPRING	
241	4822 492 33425	SPRING	
242	4822 361 21682	MOTOR,CAPSTAN	
243	4822 116 90871	DEW SENSOR	
244	4822 479 30162	BRUSH	
245	4822 432 60821	COVER,TAPE	
246	4822 691 20873	CASSETTE HOLDER AS	
247	4822 532 52549	WASHER	
501	4822 691 20878	CYLINDER	M870/01
501	4822 691 20874	CYLINDER	M820/01

LENS BLOCK

601	4822 464 51007	FRAME,LENS	
602	4822 276 13462	SWITCH	M870 only
603	4822 691 20875	LENS,ZOOM	
604	4822 466 93307	PLATE,SENSOR	
605	4822 256 92124	HOLDER,SENSOR	
606	4822 432 60828	LID,SENSOR	
607	4822 466 62434	RUBBER	
608	4822 480 30352	FILTER	
610	4822 466 62435	CUSHION	
651	4822 361 21683	IRIS BLOCK	
652	4822 361 21684	MOTOR,ZOOM	
653	4822 361 21685	MOTOR,AUTO FOCUS	
654	4822 130 83517	SENSOR	
655	4822 466 10641	CONNECTOR FLEXIBLE	
656	4822 502 21403	SCREW	
657	4822 502 21405	SCREW	
658	4822 502 21404	SCREW	
659	4822 532 52546	RUBBER	

EVF SECTION

700	4822 691 20876	EVF ASSY	
701	4822 131 20587	CRT	
702	4822 432 60827	CASE,CRT(U)	
703	4822 432 60826	CASE,CRT(B)	
704	4822 432 60822	COVER	
705	4822 432 60824	CASE,EVF (R)	
706	4822 432 60825	CASE,EVF (L)	
707	4822 381 11446	LENS,EVF	
708	4822 462 42062	CAP,EYE	
709	4822 466 93306	SPACER	

SCREWS

901	4822 502 21409	SCREW (2X6)	
902	4822 502 21411	SCREW(2X3)	
903	4822 502 21414	SCREW	
904	4822 502 21416	SCREW (2X6)	
905	4822 502 21407	SCREW	
906	4822 502 21415	SCREW(2X3)	

△.....Safety component, use only this type

REPLACEMENT PARTSLIST M820/ M870

907	4822 502 21406	SCREW(2X4)
908	4822 502 21412	SCREW(2X7)
910	4822 502 21408	SCREW(2X5)
911	4822 502 21413	SCREW 1.7X5
951	4822 502 21418	PAN HEAD SCREW-1.4MM
952	4822 502 21417	SCREW(1.7X5)
953	4822 502 21421	SCREW(1.4X2)
954	4822 502 21429	SCREW(1.4X2.5)
955	4822 502 21418	PAN HEAD SCREW-1.4MM
956	4822 502 21424	SCREW(1.7X6)
957	4822 502 21426	SCREW(1.7X8.0)
958	4822 502 21419	SCREW
959	4822 502 21428	SCREW(1.4X2.0)
960	4822 502 21423	SCREW(1.7X3)
961	4822 502 21427	SCREW(2X5)
962	4822 502 21422	SCREW
963	4822 502 21425	1.7X2 SCREW
964	4822 502 21431	SCREW(2X3)

ACCESSORIES

801	4822 736 53615	OPERATING GUIDE M870	
801	4822 736 53615	OPERATING GUIDE M820	
802	4822 691 20877	AC ADAPTER	
803	4822 321 62229	DC-CORD	
804	4822 321 62227	CORD,AV OUTPUT	M870/21
804	4822 321 62228	CORD,AV OUTPUT	M820/21
805	4822 267 31718	PLUG	M870/21
805	4822 267 31719	PLUG	M820/21
806	4822 218 30725	REMOTE HAND SET	
807	4822 498 40601	STRAP,SHOULDER	
808	4822 600 70736	HOLDER,REMOCON	
	4822 138 10541	RECHARGEABLE BATTERY	

MAIN P.C.B

CAPACITORS

C0101	4822 126 13007	0.01μF/ 25V	
C0102	4822 124 80731	47μF/ 10V	
C0103	4822 126 13008	0.022μF/ 25V	
C0104	4822 126 13019	0.1μF/ 16V	
C0107	4822 126 13019	0.1μF/ 16V	
C0108	4822 126 13008	0.022μF/ 25V	
C0110	4822 126 13008	0.022μF/ 25V	
C0111	4822 126 13019	0.1μF/ 16V	
C0112	4822 126 13007	0.01μF/ 25V	
C0113	4822 124 80734	0.1μF/ 35V	
C0118	4822 126 12976	39PF/ 50V	
C0119	4822 126 12975	33PF/ 50V	
C0120	4822 126 12977	47PF/ 50V	
C0121	4822 126 13019	0.1μF/ 16V	
C0122	4822 126 13007	0.01μF/ 25V	
C0123	4822 126 12969	12PF/ 50V	
C0124	4822 126 12978	56PF/ 50V	
C0125	4822 126 13026	5PF/ 50V	
C0126	4822 126 12981	100PF/ 50V	M870 only
C0127	4822 126 13008	0.022μF/ 25V	
C0128	4822 126 12985	270PF/ 50V	
C0129	4822 126 12977	47PF/ 50V	
C0130	4822 126 12979	68PF/ 50V	
C0131	4822 126 13025	2.0PF 50V	
C0132	4822 126 13015	1000PF/ 50V	M870 only
C0133	4822 126 12976	39PF/ 50V	M870 only
C0134	4822 126 13007	0.01μF/ 25V	
C0135	4822 126 13007	0.01μF/ 25V	
C0136	4822 126 13007	0.01μF/ 25V	M870 only
C0137	4822 126 12954	0.047μF/ 16V	
C0138	4822 126 13007	0.01μF/ 25V	
C0140	4822 126 13007	0.01μF/ 25V	
C0141	4822 126 13007	0.01μF/ 25V	
C0142	4822 126 13031	1.0PF/ 50V	

C0143	4822 126 13007	0.01μF/ 25V	
C0144	4822 126 12975	33PF/ 50V	
C0146	4822 126 13017	3300PF/ 50V	
C0147	4822 126 13007	0.01μF/ 25V	
C0148	4822 124 80758	47μF/ 6.3V	
C0149	4822 126 13016	2700PF/ 50V	
C0150	4822 126 12947	75PF/ 50V	
C0151	4822 126 12976	39PF/ 50V	
C0153	4822 126 12996	270PF/ 50V	
C0154	4822 126 12976	39PF/ 50V	M870 only
C0155	4822 126 12978	56PF/ 50V	
C0156	4822 126 12975	33PF/ 50V	
C0157	4822 126 12973	22PF/ 50V	M870 only
C0160	4822 126 13027	6.0PF/ 50V	M870 only
C0161	4822 126 13007	0.01μF/ 25V	
C0162	4822 126 13007	0.01μF/ 25V	
C0163	4822 126 13007	0.01μF/ 25V	
C0166	4822 126 13007	0.01μF/ 25V	
C0167	4822 124 80758	47μF/ 6.3V	
C0168	4822 126 13007	0.01μF/ 25V	
C0169	4822 126 13007	0.01μF/ 25V	
C0170	4822 126 12972	18PF/ 50V	
C0172	4822 126 13019	0.1μF/ 16V	
C0174	4822 126 13007	0.01μF/ 25V	
C0177	4822 126 13007	0.01μF/ 25V	
C0201	4822 126 13007	0.01μF/ 25V	
C0203	4822 126 13031	1.0PF/ 50V	
C0204	4822 126 13007	0.01μF/ 25V	
C0205	4822 126 13007	0.01μF/ 25V	
C0206	4822 124 80742	3.3μF/ 6V	
C0207	4822 124 80758	47μF/ 6.3V	
C0208	4822 126 13007	0.01μF/ 25V	
C0209	4822 126 13019	0.1μF/ 16V	
C0212	4822 126 13004	0.047μF/ 16V	
C0213	4822 126 12991	68PF/ 50V	
C0214	4822 126 12964	0.47μF/ 16V	
C0215	4822 124 80736	0.33μF/ 35V	
C0216	4822 126 12975	33PF/ 50V	
C0217	4822 124 80758	47μF/ 6.3V	
C0218	4822 126 13007	0.01μF/ 25V	
C0220	4822 126 12978	56PF/ 50V	
C0223	4822 126 13008	0.022μF/ 25V	
C0225	4822 126 13007	0.01μF/ 25V	
C0226	4822 126 13006	6800PF/ 25V	
C0227	4822 126 13008	0.022μF/ 25V	
C0229	4822 126 13007	0.01μF/ 25V	
C0230	4822 126 12971	15PF/ 50V	
C0231	4822 126 12955	0.1μF/ 16V	
C0232	4822 126 13007	0.01μF/ 25V	
C0233	4822 126 13015	1000PF/ 50V	
C0234	4822 124 80743	4.7μF/ 4V	
C0235	4822 124 80746	10μF/ 4V	
C0236	4822 124 80743	4.7μF/ 4V	
C0237	4822 126 13007	0.01μF/ 25V	
C0238	4822 126 12965	1μF/ 16V	
C0239	4822 124 80743	4.7μF/ 4V	
C0240	4822 124 80743	4.7μF/ 4V	
C0242	4822 126 13007	0.01μF/ 25V	
C0243	4822 124 80753	10μF/ 16V	
C0244	4822 126 12955	0.1μF/ 16V	
C0246	4822 126 12993	100PF/ 50V	
C0247	4822 126 13019	0.1μF/ 16V	
C0248	4822 124 80758	47μF/ 6.3V	
C0249	4822 126 13007	0.01μF/ 25V	
C0250	4822 126 13008	0.022μF/ 25V	
C0251	4822 126 12973	22PF/ 50V	
C0252	4822 126 12971	15PF/ 50V	
C0254	4822 126 12994	120PF/ 50V	M870 only
C0255	4822 126 12991	68PF/ 50V	M870 only
C0256	4822 126 13008	0.022μF/ 25V	
C0257	4822 126 13024	18PF/ 50V	
C0258	4822 126 12997	390PF/ 50V	
C0259	4822 126 13007	0.01μF/ 25V	
C0260	4822 126 13008	0.022μF/ 25V	
C0261	4822 126 13027	6.0PF/ 50V	M870 only
C0262	4822 126 12965	1μF/ 16V	

⚠.....Safety component, use only this type

REPLACEMENT PARTSLIST M820/ M870

C0263	4822 126 12965	1μF/ 16V		C0414	4822 126 12964	0.47μF/ 16V	
C0264	4822 126 13015	1000PF/ 50V		C0415	4822 126 13007	0.01μF/ 25V	
C0265	4822 126 13007	0.01μF/ 25V		C0416	4822 126 12998	470PF/ 50V	
C0266	4822 124 80749	3.3μF/ 35V		C0417	4822 126 13017	3300PF/ 50V	
C0267	4822 126 13007	0.01μF/ 25V		C0418	4822 124 80739	2.2μF/ 6V	
C0268	4822 124 80746	10μF/ 4V		C0419	4822 126 12965	1μF/ 16V	
C0269	4822 126 12967	4.0PF/ 50V		C0420	4822 126 12965	1μF/ 16V	
C0270	4822 126 12982	120PF/ 50V		C0421	4822 126 12965	1μF/ 16V	
C0271	4822 126 13024	18PF/ 50V		C0422	4822 126 12965	1μF/ 16V	
C0272	4822 126 13015	1000PF/ 50V		C0423	4822 124 80743	4.7μF/ 4V	
C0273	4822 126 13007	0.01μF/ 25V		C0424	4822 124 80753	10μF/ 16V	
C0275	4822 124 80742	3.3μF/ 6V		C0425	4822 126 12965	1μF/ 16V	M870 only
C0276	4822 126 13008	0.022μF/ 25V		C0426	4822 126 12965	1μF/ 16V	M870 only
C0277	4822 124 80749	3.3μF/ 35V		C0427	4822 126 12965	1μF/ 16V	
C0278	4822 126 12955	0.1μF/ 16V		C0428	4822 126 12965	1μF/ 16V	M870 only
C0279	4822 126 13007	0.01μF/ 25V		C0429	4822 124 80753	10μF/ 16V	
C0280	4822 126 13007	0.01μF/ 25V		C0430	4822 126 13017	3300PF/ 50V	M870 only
C0281	4822 126 13007	0.01μF/ 25V		C0431	4822 126 12998	470PF/ 50V	M870 only
C0282	4822 126 13007	0.01μF/ 25V		C0432	4822 126 13007	0.01μF/ 25V	M870 only
C0283	4822 126 12992	82PF/ 50V		C0433	4822 126 12964	0.47μF/ 16V	M870 only
C0285	4822 126 12993	100PF/ 50V		C0434	4822 126 12999	1000PF/ 50V	M870 only
C0286	4822 126 13019	0.1μF/ 16V	M870 only	C0435	4822 126 12999	1000PF/ 50V	M870 only
C0287	4822 126 12995	220PF/ 50V		C0436	4822 124 80739	2.2μF/ 6V	M870 only
C0288	4822 124 80753	10μF/ 16V		C0437	4822 124 80743	4.7μF/ 4V	M870 only
C0289	4822 124 80763	220μF/ 4V		C0438	4822 124 80755	33μF/ 4V	M870 only
C0290	4822 124 80763	220μF/ 4V		C0439	4822 126 12959	1500PF/ 50V	M870 only
C0291	4822 124 80753	10μF/ 16V	M870 only	C0440	4822 126 12961	2200PF/ 50V	M870 only
C0292	4822 124 80739	2.2μF/ 6V		C0441	4822 126 12964	0.47μF/ 16V	M870 only
C0293	4822 126 13007	0.01μF/ 25V		C0442	4822 126 12999	1000PF/ 50V	M870 only
C0294	4822 126 12968	10PF/ 50V	M870 only	C0444	4822 126 13029	680PF/ 50V	M870 only
C0295	4822 126 12977	47PF/ 50V	M870 only	C0445	4822 126 12995	220PF/ 50V	
C0296	4822 126 12982	120PF/ 50V		C0446	4822 126 12999	1000PF/ 50V	M870 only
C0297	4822 126 12969	12PF/ 50V		C0447	4822 124 80737	0.47μF/ 25V	
C0299	4822 126 13019	0.1μF/ 16V		C0448	4822 126 13008	0.022μF/ 25V	
C0301	4822 126 12994	120PF/ 50V		C0449	4822 126 13007	0.01μF/ 25V	
C0302	4822 126 13015	1000PF/ 50V		C0450	4822 126 13022	0.01μF/ 50V	
C0303	4822 124 80746	10μF/ 4V		C0451	4822 126 13022	0.01μF/ 50V	
C0304	4822 126 12981	100PF/ 50V		C0452	4822 126 13022	0.01μF/ 50V	
C0305	4822 126 12997	390PF/ 50V		C0453	4822 126 12965	1μF/ 16V	
C0306	4822 126 13007	0.01μF/ 25V		C0455	4822 124 80738	1.0μF/ 16V	
C0307	4822 126 13015	1000PF/ 50V		C0457	4822 126 12965	1μF/ 16V	M870 only
C0308	4822 124 80752	4.7μF/ 25V		C0458	4822 124 80738	1.0μF/ 16V	M870 only
C0309	4822 126 13022	0.01μF/ 50V		C0459	4822 124 80738	1.0μF/ 16V	M870 only
C0310	4822 126 12988	47PF/ 50V		C0460	4822 124 80758	47μF/ 6.3V	
C0311	4822 126 13022	0.01μF/ 50V		C0462	4822 126 13038	22PF/ 50V	M870 only
C0312	4822 126 13022	0.01μF/ 50V		C0463	4822 126 13007	0.01μF/ 25V	M870 only
C0313	4822 124 80758	47μF/ 6.3V		C0464	4822 124 80737	0.47μF/ 25V	M870 only
C0314	4822 126 13022	0.01μF/ 50V		C0465	4822 126 12999	1000PF/ 50V	M870 only
C0315	4822 126 13022	0.01μF/ 50V		C0466	4822 126 12955	0.1μF/ 16V	
C0316	4822 124 80753	10μF/ 16V		C0467	4822 126 13003	0.033μF/ 16V	
C0375	4822 126 13022	0.01μF/ 50V		C0468	4822 126 13019	0.1μF/ 16V	M870 only
C0376	4822 126 13007	0.01μF/ 25V		C0469	4822 126 13007	0.01μF/ 25V	
C0377	4822 126 13007	0.01μF/ 25V		C0470	4822 126 13007	0.01μF/ 25V	
C0379	4822 124 80753	10μF/ 16V		C0471	4822 126 13005	0.0056μF/ 25V	
C0383	4822 126 13007	0.01μF/ 25V		C0472	4822 126 13002	0.022μF/ 16V	
C0388	4822 124 80738	1.0μF/ 16V	M870 only	C0473	4822 126 13002	0.022μF/ 16V	
C0390	4822 126 12955	0.1μF/ 16V		C0474	4822 126 13023	0.022μF/ 50V	
C0391	4822 126 13007	0.01μF/ 25V		C0475	4822 126 13007	0.01μF/ 25V	
C0392	4822 126 13028	7.0PF/ 50V	M870 only	C0476	4822 126 13007	0.01μF/ 25V	
C0394	4822 126 13007	0.01μF/ 25V		C0477	4822 126 13007	0.01μF/ 25V	
C0395	4822 124 80758	47μF/ 6.3V		C0478	4822 124 80748	2.2μF/ 50V	
C0399	4822 124 80753	10μF/ 16V		C0479	4822 126 13002	0.022μF/ 16V	M870 only
C0400	4822 126 13015	1000PF/ 50V		C0480	4822 126 13002	0.022μF/ 16V	M870 only
C0401	4822 126 13038	22PF/ 50V	M870 only	C0481	4822 126 13007	0.01μF/ 25V	M870 only
C0401	4822 126 12975	33PF/ 50V	M820 only	C0482	4822 126 13036	5600PF/ 50V	M870 only
C0402	4822 124 80738	1.0μF/ 16V		C0483	4822 126 13007	0.01μF/ 25V	M870 only
C0403	4822 126 12999	1000PF/ 50V		C0484	4822 126 13019	0.1μF/ 16V	M870 only
C0405	4822 126 12999	1000PF/ 50V		C0485	4822 126 12955	0.1μF/ 16V	M870 only
C0406	4822 126 12964	0.47μF/ 16V		C0486	4822 126 13003	0.033μF/ 16V	M870 only
C0407	4822 126 12961	2200PF/ 50V		C0487	4822 124 80753	10μF/ 16V	
C0408	4822 126 12959	1500PF/ 50V		C0491	4822 126 13007	0.01μF/ 25V	
C0409	4822 124 80755	33μF/ 4V		C0492	4822 126 13007	0.01μF/ 25V	
C0410	4822 124 80739	2.2μF/ 6V		C0495	4822 126 13007	0.01μF/ 25V	
C0411	4822 124 80743	4.7μF/ 4V		C0496	4822 126 13007	0.01μF/ 25V	
C0412	4822 126 12999	1000PF/ 50V		C0499	4822 124 80758	47μF/ 6.3V	
C0413	4822 126 12999	1000PF/ 50V		C0551	4822 126 12987	33PF/ 50V	

⚠.....Safety component, use only this type

REPLACEMENT PARTSLIST M820/ M870

C0552	4822 126 13018	4700PF/ 50V	C0919	4822 126 12971	15PF/ 50V
C0553	4822 126 12958	0.01µF/ 25V	C0920	4822 126 12971	15PF/ 50V
C0554	4822 126 12958	0.01µF/ 25V	C0921	4822 126 13007	0.01µF/ 25V
C0555	4822 126 12951	100PF/ 50V	C0922	4822 126 13007	0.01µF/ 25V
C0556	4822 126 12955	0.1µF/ 16V	C0923	4822 126 12974	27PF/ 50V
C0557	4822 124 80753	10µF/ 16V	C0924	4822 126 12974	27PF/ 50V
C0558	4822 126 12955	0.1µF/ 16V	C0926	4822 126 12965	1µF/ 16V
C0559	4822 126 12955	0.1µF/ 16V	C0928	4822 126 12975	33PF/ 50V
C0560	4822 126 13011	330PF/ 50V	C0929	4822 126 12981	100PF/ 50V
C0562	4822 126 13012	390PF/ 50V	C0930	4822 126 12984	220PF/ 50V
C0563	4822 126 12989	56PF/ 50V	C0933	4822 126 13007	0.01µF/ 25V
C0564	4822 126 13011	330PF/ 50V	C0934	4822 126 13007	0.01µF/ 25V
C0565	4822 126 12987	33PF/ 50V	C0935	4822 126 13007	0.01µF/ 25V
C0566	4822 124 80751	3.3µF/ 50V	C0936	4822 126 13007	0.01µF/ 25V
C0568	4822 124 80732	10µF/ 10V	C0937	4822 126 13019	0.1µF/ 16V
C0570	4822 124 80732	10µF/ 10V	C0942	4822 126 13007	0.01µF/ 25V
C0571	4822 124 80732	10µF/ 10V	C0944	4822 124 80758	47µF/ 6.3V
C0573	4822 126 12965	1µF/ 16V	C0947	4822 126 12965	1µF/ 16V
C0574	4822 124 80754	22µF/ 6.3V	C0949	4822 126 13007	0.01µF/ 25V
C0577	4822 124 80732	10µF/ 10V	C0951	4822 126 13022	0.01µF/ 50V
C0578	4822 124 80732	10µF/ 10V	C0952	4822 126 13007	0.01µF/ 25V
C0579	4822 126 12965	1µF/ 16V	C0953	4822 126 13007	0.01µF/ 25V
C0580	4822 124 80732	10µF/ 10V	C0956	4822 126 12993	100PF/ 50V
C0584	4822 124 80732	10µF/ 10V	C0957	4822 126 13004	0.047µF/ 16V
C0585	4822 124 80761	100µF/ 4V	C1101	4822 126 12973	22PF/ 50V
C0586	4822 126 13019	0.1µF/ 16V	C1102	4822 126 12955	0.1µF/ 16V
C0587	4822 126 12965	1µF/ 16V	C1103	4822 126 13022	0.01µF/ 50V
C0588	4822 126 12965	1µF/ 16V	C1104	4822 124 80741	2.2µF/ 10V
C0589	4822 126 12965	1µF/ 16V	C1105	4822 126 12958	0.01µF/ 25V
C0591	4822 126 12965	1µF/ 16V	C1106	4822 126 13004	0.047µF/ 16V
C0592	4822 126 12965	1µF/ 16V	C1107	4822 126 13019	0.1µF/ 16V
C0593	4822 126 13004	0.047µF/ 16V	C1108	4822 124 80757	47µF/ 4V
C0594	4822 126 12965	1µF/ 16V	C1109	4822 126 13022	0.01µF/ 50V
C0605	4822 126 13014	680PF/ 50V	C1110	4822 124 80757	47µF/ 4V
C0607	4822 126 13009	220PF/ 50V	C1111	4822 126 13007	0.01µF/ 25V
C0609	4822 126 13014	680PF/ 50V	C1112	4822 126 13019	0.1µF/ 16V
C0611	4822 126 13011	330PF/ 50V	C1113	4822 126 13019	0.1µF/ 16V
C0617	4822 124 80752	4.7µF/ 25V	C1114	4822 126 13019	0.1µF/ 16V
C0618	4822 126 13019	0.1µF/ 16V	C1115	4822 126 13019	0.1µF/ 16V
C0619	4822 126 13019	0.1µF/ 16V	C1116	4822 126 13019	0.1µF/ 16V
C0620	4822 126 12977	47PF/ 50V	C1117	4822 126 13022	0.01µF/ 50V
C0621	4822 126 12977	47PF/ 50V	C1118	4822 126 13022	0.01µF/ 50V
C0622	4822 126 13002	0.022µF/ 16V	C1119	4822 124 80762	100µF/ 6.3V
C0623	4822 126 13002	0.022µF/ 16V	C1120	4822 126 13022	0.01µF/ 50V
C0624	4822 126 13002	0.022µF/ 16V	C1121	4822 126 13019	0.1µF/ 16V
C0627	4822 124 80753	10µF/ 16V	C1122	4822 126 13022	0.01µF/ 50V
C0630	4822 126 13003	0.033µF/ 16V	C1123	4822 126 13022	0.01µF/ 50V
C0631	4822 126 13003	0.033µF/ 16V	C1124	4822 126 12965	1µF/ 16V
C0632	4822 126 13003	0.033µF/ 16V	C1125	4822 126 13022	0.01µF/ 50V
C0633	4822 124 80753	10µF/ 16V	C1126	4822 126 12976	39PF/ 50V
C0634	4822 126 13004	0.047µF/ 16V	C1127	4822 126 12976	39PF/ 50V
C0635	4822 124 80744	0.47µF/ 35V	C1128	4822 124 80753	10µF/ 16V
C0636	4822 124 80747	1µF/ 50V	C1129	4822 124 80753	10µF/ 16V
C0639	4822 126 12956	0.15µF/ 16V	C1130	4822 124 80753	10µF/ 16V
C0640	4822 124 80735	0.22µF/ 35V	C1131	4822 124 80761	100µF/ 4V
C0641	4822 126 12955	0.1µF/ 16V	C1133	4822 126 13022	0.01µF/ 50V
C0642	4822 126 13001	0.015µF/ 16V	C1134	4822 126 12965	1µF/ 16V
C0643	4822 126 13001	0.015µF/ 16V	C1135	4822 126 12999	1000PF/ 50V
C0644	4822 126 13001	0.015µF/ 16V	C1136	4822 126 13037	3PF/ 50V
C0645	4822 126 13001	0.015µF/ 16V	C1137	4822 126 13037	3PF/ 50V
C0649	4822 126 13019	0.1µF/ 16V	C1138	4822 126 12999	1000PF/ 50V
C0650	4822 126 12963	0.1µF/ 16V	C1139	4822 126 13022	0.01µF/ 50V
C0652	4822 126 13011	330PF/ 50V	C1140	4822 126 13019	0.1µF/ 16V
C0653	4822 126 13013	470PF/ 50V	C1141	4822 126 13022	0.01µF/ 50V
C0654	4822 124 80753	10µF/ 16V	C1142	4822 124 80762	100µF/ 6.3V
C0901	4822 124 80759	47µF/ 16V	C1143	4822 126 13022	0.01µF/ 50V
C0902	4822 126 12964	0.47µF/ 16V	C1144	4822 126 13021	0.22µF/ 16V
C0903	4822 126 13007	0.01µF/ 25V	C1145	4822 126 13021	0.22µF/ 16V
C0904	4822 126 13019	0.1µF/ 16V	C1146	4822 126 12965	1µF/ 16V
C0905	4822 124 80758	47µF/ 6.3V	C1148	4822 126 13007	0.01µF/ 25V
C0908	4822 126 12965	1µF/ 16V	C1151	4822 126 13022	0.01µF/ 50V
C0909	4822 124 80762	100µF/ 6.3V	C1153	4822 126 12986	330PF/ 50V
C0910	4822 126 13019	0.1µF/ 16V	C1154	4822 126 13019	0.1µF/ 16V
C0912	4822 126 12965	1µF/ 16V	C1155	4822 124 80753	10µF/ 16V
C0913	4822 126 12999	1000PF/ 50V	C1156	4822 126 13007	0.01µF/ 25V
C0914	4822 124 80762	100µF/ 6.3V	C1157	4822 126 12974	27PF/ 50V

⚠.....Safety component, use only this type

REPLACEMENT PARTSLIST M820/ M870

C1158	4822 126 12986	330PF/ 50V	
C1159	4822 126 13022	0.01μF/ 50V	
C1161	4822 126 13022	0.01μF/ 50V	
C1162	4822 126 13022	0.01μF/ 50V	
C1163	4822 126 12965	1μF/ 16V	
C1164	4822 126 13022	0.01μF/ 50V	
C1166	4822 126 13021	0.22μF/ 16V	
C1167	4822 126 12965	1μF/ 16V	
C1168	4822 126 12965	1μF/ 16V	
C1169	4822 126 12969	12PF/ 50V	
C1170	4822 126 12984	220PF/ 50V	
C1171	4822 126 12964	0.47μF/ 16V	
C1172	4822 126 13019	0.1μF/ 16V	
C1173	4822 124 80747	1μF/ 50V	
C1174	4822 126 12965	1μF/ 16V	
C1175	4822 126 12948	4.7μF/ / 16V	
C1176	4822 126 12965	1μF/ 16V	
C1177	4822 126 13019	0.1μF/ 16V	
C1179	4822 126 13021	0.22μF/ 16V	
C1180	4822 126 13019	0.1μF/ 16V	
C1181	4822 126 13019	0.1μF/ 16V	
C1182	4822 126 12975	33PF/ 50V	M870 only
C1184	4822 124 80754	22μF / 6.3V	
C1185	4822 126 12972	18PF/ 50V	M820 only
C1186	4822 126 12983	150PF/ 50V	
C1187	4822 126 12983	150PF/ 50V	
C1189	4822 126 13019	0.1μF/ 16V	
C1190	4822 126 12965	1μF/ 16V	
C1192	4822 126 13019	0.1μF/ 16V	
C1193	4822 126 13022	0.01μF/ 50V	
C1302	4822 126 13022	0.01μF/ 50V	
C1174	4822 126 12965	1μF/ 16V	
C1303	4822 126 13004	0.047μF/ / 16V	
C1304	4822 126 13022	0.01μF/ 50V	
C1306	4822 126 13022	0.01μF/ 50V	
C1309	4822 126 13022	0.01μF/ 50V	
C1311	4822 126 13022	0.01μF/ 50V	
C1312	4822 126 13022	0.01μF/ 50V	
C1316	4822 126 13004	0.047μF/ 16V	
C1317	4822 126 13022	0.01μF/ 50V	
C1318	4822 126 13022	0.01μF/ 50V	
C1319	4822 126 13022	0.01μF/ 50V	
C1320	4822 124 80743	4.7μF/ 4V	
C1322	4822 124 80758	47μF/ 6.3V	
C1323	4822 124 80758	47μF/ 6.3V	
C1324	4822 124 80759	47μF/ 16V	
C1325	4822 126 13021	0.22μF/ 16V	
C1326	4822 126 12965	1μF/ 16V	
C1327	4822 126 13004	0.047μF/ 16V	
C1328	4822 126 13022	0.01μF/ 50V	
C1329	4822 126 13022	0.01μF/ 50V	
C1330	4822 126 13022	0.01μF/ 50V	
C1331	4822 126 13022	0.01μF/ 50V	
C1332	4822 126 13007	0.01μF/ 25V	
C1333	4822 126 13007	0.01μF/ 25V	
C1334	4822 126 13007	0.01μF/ 25V	
C1335	4822 126 13007	0.01μF/ 25V	
C1336	4822 126 13017	3300PF/ 50V	
C1337	4822 126 13007	0.01μF/ 25V	
C1338	4822 126 13007	0.01μF/ 25V	
C1339	4822 126 12975	33PF/ 50V	

VARIABLE RESISTORS

RT0101	4822 100 12097	
RT0102	4822 100 12096	2.2KΩ
RT0202	4822 100 12103	10KΩ M870 only
RT0203	4822 100 12104	22KΩ
RT0204	4822 100 12104	22KΩ
RT0205	4822 100 12103	10KΩ
RT0206	4822 100 12102	4.7KΩ
RT0207	4822 100 12102	4.7KΩ
RT0209	4822 100 12103	10KΩ
RT0210	4822 100 12099	470Ω
RT0211	4822 100 12102	4.7KΩ

RT0212	4822 100 12101	2.2KΩ
RT0214	4822 100 12102	4.7KΩ M870 only
RT0215	4822 100 12103	10KΩ
RT0216	4822 100 12104	22KΩ
RT0217	4822 100 12103	10KΩ M870 only
RT0301	4822 100 12098	
RT0302	4822 100 12097	
RT0401	4822 100 12105	47KΩ
RT402	4822 100 12105	47KΩ
RT0404	4822 100 12105	47KΩ M870 only
RT0405	4822 100 12105	47KΩ M870 only

RESISTORS

R0010	4822 117 10636	390Ω/ 1/8W
R0011	4822 117 10639	390Ω/ 0.1W
R0101	4822 117 10684	100Ω/ 1/16W
R0102	4822 117 10679	5.6Ω/ 1/16W
R0103	4822 117 10679	5.6Ω/ 1/16W
R0104	4822 117 10684	100Ω/ 1/16W
R0105	4822 117 10684	100Ω/ 1/16W
R0106	4822 117 10715	22KΩ/ 1/16W
R0107	4822 117 10714	18KΩ/ 1/16W
R0108	4822 117 10704	3.3KΩ/ 1/16W
R0109	4822 117 10696	820Ω/ 1/16W
R0110	4822 117 10734	820KΩ/ 1/16W
R0111	4822 117 10702	2.2KΩ/ 1/16W
R0112	4822 117 10688	220Ω/ 1/16W
R0113	4822 117 10684	100Ω/ 1/16W M870 only
R0114	4822 117 10698	1.2KΩ/ 1/16W M870 only
R0115	4822 117 10686	150Ω/ 1/16W
R0116	4822 117 10686	150Ω/ 1/16W
R0118	4822 117 10686	150Ω/ 1/16W
R0119	4822 117 10711	10KΩ/ 1/16W
R0120	4822 117 10711	10KΩ/ 1/16W
R0121	4822 117 10681	6.8Ω/ 1/16W
R0122	4822 117 10693	470Ω/ 1/16W
R0123	4822 117 10694	560Ω/ 1/16W
R0124	4822 117 10717	33KΩ/ 1/16W
R0125	4822 117 10722	68KΩ/ 1/16W
R0126	4822 117 10699	1.5KΩ/ 1/16W
R0127	4822 117 10715	22KΩ/ 1/16W
R0128	4822 117 10699	1.5KΩ/ 1/16W
R0129	4822 117 10718	39KΩ/ 1/16W M870 only
R0130	4822 117 10698	1.2KΩ / 1/16W
R0131	4822 117 10691	330Ω/ 1/16W
R0132	4822 117 10694	560Ω/ 1/16W
R0133	4822 117 10694	560Ω/ 1/16W
R0134	4822 117 10694	560Ω / 1/16W M870 only
R0135	4822 117 10684	100Ω/ 1/16W M870 only
R0136	4822 117 10694	560Ω/ 1/16W M870 only
R0137	4822 117 10694	560Ω/ 1/16W M870 only
R0138	4822 117 10696	820Ω/ 1/16W
R0140	4822 117 10703	2.7KΩ/ 1/16W
R0141	4822 117 10694	560Ω/ 1/16W
R0142	4822 117 10699	1.5KΩ/ 1/16W
R0143	4822 117 10693	470Ω/ 1/16W
R0144	4822 117 10693	470Ω/ 1/16W
R0145	4822 117 10701	1.8KΩ/ 1/16W M870 only
R0146	4822 117 10689	270Ω/ 1/16W
R0148	4822 117 10715	22KΩ/ 1/16W
R0149	4822 117 10714	18KΩ/ 1/16W
R0150	4822 117 10698	1.2KΩ/ 1/16W
R0151	4822 117 10705	3.9KΩ/ 1/16W
R0152	4822 117 10701	1.8KΩ/ 1/16W
R0153	4822 117 10696	820Ω/ 1/16W M870 only
R0154	4822 117 10696	820Ω/ 1/16W
R0155	4822 117 10701	1.8KΩ/ 1/16W M870 only
R0156	4822 117 10701	1.8KΩ / 1/16W M870 only
R0157	4822 117 10717	33KΩ/ 1/16W
R0158	4822 117 10697	1KΩ/ 1/16W
R0160	4822 117 10702	2.2KΩ/ 1/16W
R0161	4822 117 10689	270Ω/ 1/16W
R0162	4822 117 10699	1.5KΩ/ 1/16W
R0163	4822 117 10722	68KΩ/ 1/16W

△.....Safety component, use only this type

REPLACEMENT PARTSLIST M820/ M870

R0164	4822 117 10718	39KΩ/ 1/16W	R0273	4822 117 10715	22KΩ/ 1/16W
R0165	4822 117 10693	470Ω/ 1/16W	R0274	4822 117 10718	39KΩ/ 1/16W
R0166	4822 117 10693	470Ω/ 1/16W	R0275	4822 117 10693	470Ω/ 1/16W
R0168	4822 117 10699	1.5KΩ/ 1/16W M870 only	R0276	4822 117 10697	1KΩ/ 1/16W
R0169	4822 117 10695	680Ω/ 1/16W	R0277	4822 117 10702	2.2KΩ/ 1/16W
R0170	4822 117 10687	180Ω/ 1/16W	R0278	4822 117 10698	1.2KΩ/ 1/16W
R0172	4822 117 10702	2.2KΩ/ 1/16W	R0279	4822 117 10693	470Ω/ 1/16W
R0173	4822 117 10696	820Ω/ 1/16W	R0280	4822 117 10693	470Ω/ 1/16W
R0174	4822 117 10693	470Ω/ 1/16W	R0282	4822 117 10703	2.7KΩ/ 1/16W
R0175	4822 117 10693	470Ω/ 1/16W	R0283	4822 117 10711	10KΩ/ 1/16W M820 only
R0177	4822 117 10697	1KΩ/ 1/16W M870 only	R0285	4822 117 10642	75Ω/ 1/16W M870 only
R0178	4822 117 10688	220Ω/ 1/16W M870 only	R0286	4822 117 10711	10KΩ/ 1/16W
R0179	4822 117 10691	330Ω/ 1/16W M870 only	R0287	4822 117 10727	220KΩ/ 1/16W
R0180	4822 117 10694	560Ω/ 1/16W M870 only	R0288	4822 117 10684	100Ω/ 1/16W
R0182	4822 117 10697	1KΩ/ 1/16W	R0289	4822 117 10642	75Ω/ 1/16W
R0186	4822 117 10688	220Ω/ 1/16W	R0290	4822 117 10642	75Ω/ 1/16W M870 only
R0187	4822 117 10688	220Ω/ 1/16W M870 only	R0291	4822 117 10735	1MΩ/ 1/16W
R0189	4822 117 10717	33KΩ/ 1/16W M870 only	R0292	4822 117 10702	2.2KΩ/ 1/16W M870 only
R0190	4822 117 10717	33KΩ/ 1/16W M870 only	R0293	4822 117 10718	39KΩ/ 1/16W M870 only
R0191	4822 117 10715	22KΩ/ 1/16W	R0294	4822 117 10707	5.6KΩ/ 1/16W M870 only
R0192	4822 117 10707	5.6KΩ/ 1/16W	R0295	4822 117 10712	12KΩ/ 1/16W
R0193	4822 117 10723	82KΩ/ 1/16W M870 only	R0296	4822 117 10704	3.3KΩ/ 1/16W
R0194	4822 117 10699	1.5KΩ/ 1/16W M870 only	R0298	4822 117 10704	3.3KΩ/ 1/16W
R0195	4822 117 10686	150Ω/ 1/16W	R0299	4822 117 10708	6.8KΩ/ 1/16W M870 only
R0197	4822 117 10697	1KΩ/ 1/16W	R0301	4822 117 10709	8.2KΩ/ 1/16W
R0198	4822 117 10697	1KΩ/ 1/16W	R0302	4822 117 10709	8.2KΩ/ 1/16W
R0199	4822 117 10706	4.7KΩ/ 1/16W	R0303	4822 117 10706	4.7KΩ/ 1/16W
R0200	4822 117 10642	75Ω/ 1/16W	R0304	4822 117 10724	100KΩ/ 1/16W
R0201	4822 117 10706	4.7KΩ/ 1/16W M870 only	R0306	4822 117 10724	100KΩ/ 1/16W
R0202	4822 117 10706	4.7KΩ/ 1/16W M870 only	R0307	4822 117 10706	4.7KΩ/ 1/16W
R0203	4822 117 10708	6.8KΩ/ 1/16W	R0308	4822 117 10706	4.7KΩ/ 1/16W
R0205	4822 117 10707	5.6KΩ/ 1/16W	R0309	4822 117 10724	100KΩ/ 1/16W
R0206	4822 117 10699	1.5KΩ/ 1/16W	R0310	4822 117 10724	100KΩ/ 1/16W
R0207	4822 117 10697	1KΩ/ 1/16W	R0311	4822 117 10702	2.2KΩ/ 1/16W
R0208	4822 117 10698	1.2KΩ/ 1/16W	R0313	4822 117 10699	1.5KΩ/ 1/16W
R0209	4822 117 10697	1KΩ/ 1/16W M870 only	R0314	4822 117 10705	3.9KΩ/ 1/16W
R0210	4822 117 10696	820Ω/ 1/16W M870 only	R0315	4822 117 10722	68KΩ/ 1/16W
R0213	4822 117 10702	2.2KΩ/ 1/16W	R0316	4822 117 10722	68KΩ/ 1/16W
R0215	4822 117 10714	18KΩ/ 1/16W	R0317	4822 117 10697	1KΩ/ 1/16W
R0216	4822 117 10701	1.8KΩ/ 1/16W	R0318	4822 117 10697	1KΩ/ 1/16W
R0217	4822 117 10708	6.8KΩ/ 1/16W	R0319	4822 117 10713	15KΩ/ 1/16W
R0218	4822 117 10699	1.5KΩ/ 1/16W	R0320	4822 117 10717	33KΩ/ 1/16W
R0219	4822 117 10697	1KΩ/ 1/16W	R0323	4822 117 10701	1.8KΩ/ 1/16W
R0223	4822 117 10697	1KΩ/ 1/16W	R0324	4822 117 10705	3.9KΩ/ 1/16W
R0224	4822 117 10697	1KΩ/ 1/16W	R0325	4822 117 10696	820Ω/ 1/16W
R0227	4822 117 10722	68KΩ/ 1/16W	R0326	4822 117 10711	10KΩ/ 1/16W
R0228	4822 117 10722	68KΩ/ 1/16W	R0327	4822 117 10706	4.7KΩ/ 1/16W
R0230	4822 117 10711	10KΩ/ 1/16W	R0328	4822 117 10711	10KΩ/ 1/16W
R0231	4822 117 10724	100KΩ/ 1/16W	R0330	4822 117 10711	10KΩ/ 1/16W
R0239	4822 117 10689	270Ω/ 1/16W	R0333	4822 117 10706	4.7KΩ/ 1/16W
R0240	4822 117 10714	18KΩ/ 1/16W	R0334	4822 117 10711	10KΩ/ 1/16W
R0241	4822 117 10717	33KΩ/ 1/16W	R0335	4822 117 10706	4.7KΩ/ 1/16W
R0243	4822 117 10712	12KΩ/ 1/16W M870 only	R0339	4822 117 10724	100KΩ/ 1/16W
R0244	4822 117 10702	2.2KΩ/ 1/16W	R0343	4822 117 10654	11KΩ/ 1/16W
R0245	4822 117 10711	10KΩ/ 1/16W M870 only	R0345	4822 117 10709	8.2KΩ/ 1/16W
R0246	4822 117 10702	2.2KΩ/ 1/16W	R0351	4822 117 10719	47KΩ/ 1/16W
R0247	4822 117 10708	6.8KΩ/ 1/16W M870 only	R0353	4822 117 10715	22KΩ/ 1/16W M870 only
R0248	4822 117 10699	1.5KΩ/ 1/16W M870 only	R0354	4822 117 10715	22KΩ/ 1/16W M870 only
R0250	4822 117 10697	1KΩ/ 1/16W M820 only	R0356	4822 117 10729	390KΩ/ 1/16W
R0251	4822 117 10711	10KΩ/ 1/16W	R0357	4822 117 10697	1KΩ/ 1/16W
R0252	4822 117 10711	10KΩ/ 1/16W	R0359	4822 117 10719	47KΩ/ 1/16W M870 only
R0255	4822 117 10719	47KΩ/ 1/16W	R0361	4822 117 10697	1KΩ/ 1/16W
R0256	4822 117 10702	2.2KΩ/ 1/16W	R0362	4822 117 10697	1KΩ/ 1/16W
R0257	4822 117 10724	100KΩ/ 1/16W	R0363	4822 117 10708	6.8KΩ/ 1/16W
R0258	4822 117 10715	22KΩ/ 1/16W	R0364	4822 117 10696	820Ω/ 1/16W
R0259	4822 117 10721	56KΩ/ 1/16W	R0365	4822 117 10694	560Ω/ 1/16W
R0260	4822 117 10697	1KΩ/ 1/16W	R0366	4822 117 10697	1KΩ/ 1/16W
R0261	4822 117 10694	560Ω/ 1/16W	R0367	4822 117 10703	2.7KΩ/ 1/16W
R0262	4822 117 10692	390Ω/ 1/16W	R0368	4822 117 10703	2.7KΩ/ 1/16W
R0263	4822 117 10695	680Ω/ 1/16W	R0369	4822 117 10693	470Ω/ 1/16W
R0264	4822 117 10702	2.2KΩ/ 1/16W	R0371	4822 117 10711	10KΩ/ 1/16W M870 only
R0265	4822 117 10695	680Ω/ 1/16W	R0372	4822 117 10711	10KΩ/ 1/16W
R0269	4822 117 10685	120Ω/ 1/16W	R0373	4822 117 10715	22KΩ/ 1/16W
R0270	4822 117 10723	82KΩ/ 1/16W	R0374	4822 117 10716	27KΩ/ 1/16W
R0271	4822 117 10711	10KΩ/ 1/16W M870 only	R0375	4822 117 10711	10KΩ/ 1/16W M820 only
R0272	4822 117 10697	1KΩ/ 1/16W M870 only	R0376	4822 117 10697	1KΩ/ 1/16W

△.....Safety component, use only this type

REPLACEMENT PARTSLIST M820/ M870

R0381	4822 117 10696	820Ω/ 1/16W	R0498	4822 117 10697	1KΩ/ 1/16W
R0382	4822 117 10698	1.2KΩ/ 1/16W	R0551	4822 117 10707	5.6KΩ/ 1/16W
R0383	4822 117 10688	220Ω/ 1/16W	R0552	4822 117 10732	560KΩ/ 1/16W
R0384	4822 117 10704	3.3KΩ/ 1/16W	R0554	4822 117 10711	10KΩ/ 1/16W
R0387	4822 117 10697	1KΩ/ 1/16W	R0556	4822 117 10732	560KΩ/ 1/16W
R0388	4822 117 10712	12KΩ/ 1/16W	R0558	4822 117 10711	10KΩ/ 1/16W
R0390	4822 117 10713	15KΩ/ 1/16W M870 only	R0560	4822 117 10711	10KΩ/ 1/16W
R0391	4822 117 10712	12KΩ/ 1/16W M820 only	R0562	4822 117 10717	33KΩ/ 1/16W
R0392	4822 117 10697	1.0KΩ/ 1/16W M870 only	R0563	4822 117 10716	27KΩ/ 1/16W
R0394	4822 117 10699	1.5KΩ/ 1/16W	R0566	4822 117 10697	1KΩ/ 1/16W
R0395	4822 117 10699	1.5KΩ/ 1/16W	R0567	4822 117 10715	22KΩ/ 1/16W
R0396	4822 117 10685	120Ω/ 1/16W	R0568	4822 117 10719	47KΩ/ 1/16W
R0398	4822 117 10697	1KΩ/ 1/16W	R0570	4822 117 10712	12KΩ/ 1/16W
R0401	4822 117 10641	10KΩ/ 0.1W	R0571	4822 117 10713	15KΩ/ 1/16W
R0403	4822 117 10699	1.5KΩ/ 1/16W	R0572	4822 117 10707	5.6KΩ/ 1/16W
R0404	4822 117 10702	2.2KΩ/ 1/16W	R0574	4822 117 10646	4.7KΩ/ 1/16W
R0405	4822 117 10701	1.8KΩ/ 1/16W	R0575	4822 117 10715	22KΩ/ 1/16W
R0406	4822 117 10713	15KΩ/ 1/16W	R0576	4822 117 10712	12KΩ/ 1/16W
R0407	4822 117 10718	39KΩ/ 1/16W	R0579	4822 117 10706	4.7KΩ/ 1/16W
R0408	4822 117 10697	1KΩ/ 1/16W	R0580	4822 117 10711	10KΩ/ 1/16W
R0409	4822 117 10718	39KΩ/ 1/16W M870 only	R0581	4822 117 10706	4.7KΩ/ 1/16W
R0410	4822 117 10697	1KΩ/ 1/16W M870 only	R0582	4822 117 10707	5.6KΩ/ 1/16W
R0411	4822 117 10713	15KΩ/ 1/16W M870 only	R0584	4822 117 10644	3.9KΩ/ 1/10W
R0412	4822 117 10701	1.8KΩ/ 1/16W	R0585	4822 117 10712	12KΩ/ 1/16W
R0413	4822 117 10702	2.2KΩ/ 1/16W M870 only	R0586	4822 117 10712	12KΩ/ 1/16W
R0414	4822 117 10699	1.5KΩ/ 1/16W M870 only	R0587	4822 117 10719	47KΩ/ 1/16W
R0416	4822 117 10641	10KΩ/ 0.1W M870 only	R0588	4822 117 10649	22KΩ/ 1/16W
R0417	4822 117 10711	10KΩ/ 1/16W	R0589	4822 117 10648	12KΩ/ 1/16W
R0418	4822 117 10697	1KΩ/ 1/16W M870 only	R0590	4822 117 10647	5.6KΩ/ 1/16W
R0419	4822 117 10696	820Ω/ 1/16W M870 only	R0591	4822 117 10725	120KΩ/ 1/16W
R0420	4822 117 10711	10KΩ/ 1/16W M870 only	R0592	4822 117 10722	68KΩ/ 1/16W
R0421	4822 117 10711	10KΩ/ 1/16W	R0593	4822 117 10733	680KΩ/ 1/16W
R0422	4822 117 10696	820Ω/ 1/16W	R0594	4822 117 10724	100KΩ/ 1/16W
R0423	4822 117 10697	1KΩ/ 1/16W	R0595	4822 117 10722	68KΩ/ 1/16W
R0424	4822 117 10726	150KΩ/ 1/16W	R0605	4822 117 10722	68KΩ/ 1/16W
R0425	4822 117 10707	5.6KΩ/ 1/16W	R0606	4822 117 10722	68KΩ/ 1/16W
R0428	4822 117 10707	5.6KΩ/ 1/16W M870 only	R0607	4822 117 10722	68KΩ/ 1/16W
R0429	4822 117 10726	150KΩ/ 1/16W M870 only	R0609	4822 117 10722	68KΩ/ 1/16W
R0432	4822 117 10724	100KΩ/ 1/16W	R0610	4822 117 10722	68KΩ/ 1/16W
R0433	4822 117 10719	47KΩ/ 1/16W	R0611	4822 117 10722	68KΩ/ 1/16W
R0434	4822 117 10719	47KΩ/ 1/16W M870 only	R0616	4822 117 10706	4.7KΩ/ 1/16W
R0435	4822 117 10688	220Ω/ 1/16W M870 only	R0620	4822 117 10711	10KΩ/ 1/16W
R0436	4822 117 10688	220Ω/ 1/16W	R0621	4822 117 10711	10KΩ/ 1/16W
R0437	4822 117 10713	15KΩ/ 1/16W	R0622	4822 117 10711	10KΩ/ 1/16W
R0438	4822 117 10713	15KΩ/ 1/16W M870 only	R0623	4822 117 10711	10KΩ/ 1/16W
R0439	4822 117 10698	1.2KΩ/ 1/16W M870 only	R0624	4822 117 10713	15KΩ/ 1/16W
R0440	4822 117 10711	10KΩ/ 1/16W M870 only	R0625	4822 117 10721	56KΩ/ 1/16W
R0441	4822 117 10709	8.2KΩ/ 1/16W	R0626	4822 117 10697	1KΩ/ 1/16W
R0442	4822 117 10699	1.5KΩ/ 1/16W	R0634	4822 117 10695	680Ω/ 1/16W
R0443	4822 117 10706	4.7KΩ/ 1/16W	R0635	4822 117 10677	43KΩ/ 1/16W
R0444	4822 117 10718	39KΩ/ 1/16W	R0637	4822 117 10735	1MΩ/ 1/16W
R0445	4822 117 10717	33KΩ/ 1/16W	R0639	4822 117 10697	1KΩ/ 1/16W
R0446	4822 117 10697	1KΩ/ 1/16W	R0641	4822 117 10729	390KΩ/ 1/16W
R0447	4822 117 10719	47KΩ/ 1/16W	R0643	4822 117 10721	56KΩ/ 1/16W
R0448	4822 117 10726	150KΩ/ 1/16W	R0644	4822 117 10697	1KΩ/ 1/16W
R0449	4822 117 10726	150KΩ/ 1/16W	R0645	4822 117 10702	2.2KΩ/ 1/16W
R0450	4822 117 10726	150KΩ/ 1/16W	R0646	4822 117 10711	10KΩ/ 1/16W
R0451	4822 117 10733	680KΩ/ 1/16W	R0647	4822 117 10712	12KΩ/ 1/16W
R0452	4822 117 10717	33KΩ/ 1/16W M870 only	R0648	4822 117 10682	47Ω/ 1/16W
R0453	4822 117 10718	39KΩ/ 1/16W M870 only	R0649	4822 117 10721	56KΩ/ 1/16W
R0454	4822 117 10706	4.7KΩ/ 1/16W M870 only	R0650	4822 117 10721	56KΩ/ 1/16W
R0455	4822 117 10699	1.5KΩ/ 1/16W M870 only	R0651	4822 117 10721	56KΩ/ 1/16W
R0456	4822 117 10709	8.2KΩ/ 1/16W M870 only	R0652	4822 117 10645	1.0Ω/ 1/10 W
R0457	4822 117 10711	10KΩ/ 1/16W M870 only	R0653	4822 117 10645	1.0Ω/ 1/10 W
R0458	4822 117 10698	1.2KΩ/ 1/16W M870 only	R0656	4822 117 10715	22KΩ/ 1/16 W
R0475	4822 117 10712	12KΩ/ 1/16W	R0658	4822 117 10702	2.2KΩ/ 1/16 W
R0476	4822 117 10712	12KΩ/ 1/16W	R0659	4822 117 10711	10KΩ/ 1/16 W
R0477	4822 117 10712	12KΩ/ 1/16W	R0663	4822 117 10682	47Ω/ 1/16 W
R0478	4822 117 10712	12KΩ/ 1/16W	R0668	4822 117 10724	100KΩ/ 1/16 W
R0479	4822 117 10706	4.7KΩ/ 1/16W	R0680	4822 117 10733	680KΩ/ 1/16 W
R0480	4822 117 10686	150Ω/ 1/16W	R0701	4822 117 10719	47KΩ/ 1/16 W
R0481	4822 117 10706	4.7KΩ/ 1/16W	R0702	4822 117 10706	4.7KΩ/ 1/16 W
R0488	4822 117 10725	120Ω/ 1/16W M870 only	R0703	4822 117 10686	150Ω/ 1/16 W
R0489	4822 117 10725	120Ω/ 1/16W	R0704	4822 117 10715	22KΩ/ 1/16 W
R0493	4822 117 10702	2.2KΩ/ 1/16W	R0705	4822 117 10668	39KΩ/ 1/16 W
R0497	4822 117 10702	2.2KΩ/ 1/16W	R0706	4822 117 10702	2.2KΩ/ 1/16 W

△.....Safety component, use only this type

REPLACEMENT PARTSLIST M820/ M870

R0707	4822 117 10724	100KΩ/ 1/16W	R0950	4822 117 10711	10KΩ/ 1/16W
R0708	4822 117 10652	27KΩ/ 1/16W	R0951	4822 117 10735	1MΩ/ 1/16W
R0709	4822 117 10668	39KΩ/ 1/16W	R0952	4822 117 10704	3.3KΩ/ 1/16W
R0710	4822 117 10652	27KΩ/ 1/16W	R0953	4822 117 10702	2.2KΩ/ 1/16W
R0711	4822 117 10719	47KΩ/ 1/16W	R0954	4822 117 10692	390Ω/ 1/16W
R0712	4822 117 10724	100KΩ/ 1/16W	R0955	4822 117 10709	8.2KΩ/ 1/16W
R0713	4822 117 10735	1MΩ/ 1/16W	R0956	4822 117 10692	390Ω/ 1/16W
R0714	4822 117 10726	150KΩ/ 1/16W	R0957	4822 117 10697	1KΩ/ 1/16W
R0715	4822 117 10711	10KΩ/ 1/16W	R0958	4822 117 10696	820Ω/ 1/16W
R0717	4822 117 10698	1.2KΩ/ 1/16W	R0959	4822 117 10706	4.7KΩ/ 1/16W
R0718	4822 117 10711	10KΩ/ 1/16W	R0960	4822 117 10643	10KΩ/ 1/10W
R0719	4822 117 10711	10KΩ/ 1/16W	R0961	4822 117 10643	10KΩ/ 1/10W
R0721	4822 117 10697	1KΩ/ 1/16W	R0962	4822 117 10706	4.7KΩ/ 1/16W
R0722	4822 117 10657	10KΩ/ 1/16W	R0963	4822 117 10719	47KΩ/ 1/16W
R0723	4822 117 10652	27KΩ/ 1/16W	R0964	4822 117 10711	10KΩ/ 1/16W
R0732	4822 117 10711	10KΩ/ 1/16W	R0965	4822 117 10711	10KΩ/ 1/16W
R0734	4822 117 10711	10KΩ/ 1/16W	R0967	4822 117 10697	1KΩ/ 1/16W
R0736	4822 117 10706	4.7KΩ/ 1/16W	R0968	4822 117 10697	1KΩ/ 1/16W
R0738	4822 117 10711	10KΩ/ 1/16W	R0969	4822 117 10719	47KΩ/ 1/16W
R0739	4822 117 10711	10KΩ/ 1/16W	R0973	4822 117 10719	47KΩ/ 1/16W
R0740	4822 117 10706	4.7KΩ/ 1/16W	R0974	4822 117 10719	47KΩ/ 1/16W
R0741	4822 117 10687	180Ω/ 1/16W	R0975	4822 117 10638	150Ω/ 0.1W
R0742	4822 117 10719	47KΩ/ 1/16W	R0976	4822 117 10638	150Ω/ 0.1W
R0743	4822 117 10711	10KΩ/ 1/16W	R0977	4822 117 10697	1KΩ/ 1/16W
R0744	4822 117 10697	1KΩ/ 1/16W	R0978	4822 117 10711	10KΩ/ 1/16W
R0745	4822 117 10711	10KΩ/ 1/16W	R0979	4822 117 10707	5.6KΩ/ 1/16W
R0746	4822 117 10711	10KΩ/ 1/16W	R0980	4822 117 10711	10KΩ/ 1/16W
R0747	4822 117 10711	10KΩ/ 1/16W	R0983	4822 117 10719	47KΩ/ 1/16W
R0748	4822 117 10711	10KΩ/ 1/16W	R0984	4822 117 10719	47KΩ/ 1/16W
R0749	4822 117 10711	10KΩ/ 1/16W	R0985	4822 117 10719	47KΩ/ 1/16W
R0750	4822 117 10711	10KΩ/ 1/16W	R0986	4822 117 10731	470KΩ/ 1/16W
R0751	4822 117 10733	680KΩ/ 1/16W	R0987	4822 117 10719	47KΩ/ 1/16W
R0752	4822 117 10719	47KΩ/ 1/16W	R0988	4822 117 10715	22KΩ/ 1/16W
R0754	4822 117 10724	100KΩ/ 1/16W	R0989	4822 117 10715	22KΩ/ 1/16W
R0755	4822 117 10735	1MΩ/ 1/16W	R0990	4822 117 10719	47KΩ/ 1/16W
R0901	4822 117 10719	47KΩ/ 1/16W	R0991	4822 117 10731	470KΩ/ 1/16W
R0902	4822 117 10697	1KΩ/ 1/16W	R0994	4822 117 10699	1.5KΩ/ 1/16W
R0903	4822 117 10699	1.5KΩ/ 1/16W	R0997	4822 117 10699	1.5KΩ/ 1/16W
R0904	4822 117 10706	4.7KΩ/ 1/16W	R1100	4822 117 10697	1KΩ/ 1/16W
R0905	4822 117 10711	10KΩ/ 1/16W	R1101	4822 117 10727	220KΩ/ 1/16W
R0907	4822 117 10719	47KΩ/ 1/16W	R1102	4822 117 10713	15KΩ/ 1/16W
R0908	4822 117 10669	47KΩ/ 1/16W	R1103	4822 117 10715	22KΩ/ 1/16W
R0909	4822 117 10671	120KΩ/ 1/16W	R1104	4822 117 10706	4.7KΩ/ 1/16W M820 only
R0910	4822 117 10735	1MΩ/ 1/16W	R1106	4822 117 10711	10KΩ/ 1/16W
R0911	4822 117 10711	10KΩ/ 1/16W	R1107	4822 117 10688	220Ω/ 1/16W
R0912	4822 117 10719	47KΩ/ 1/16W	R1108	4822 117 10687	180Ω/ 1/16W M820 only
R0913	4822 117 10724	100KΩ/ 1/16W	R1108	4822 117 10684	100Ω/ 1/16W M870 only
R0914	4822 117 10724	100KΩ/ 1/16W	R1109	4822 117 10684	100Ω/ 1/16W
R0915	4822 117 10731	470KΩ/ 1/16W	R1110	4822 117 10736	68Ω/ 1/16W
R0916	4822 117 10735	1MΩ/ 1/16W	R1111	4822 117 10659	4.22KΩ/ 1/16W
R0917	4822 117 10735	1MΩ/ 1/16W	R1113	4822 117 10698	1.2KΩ/ 1/16W
R0918	4822 117 10727	220KΩ/ 1/16W	R1114	4822 117 10702	2.2KΩ/ 1/16W
R0919	4822 117 10711	10KΩ/ 1/16W	R1115	4822 117 10697	1KΩ/ 1/16W
R0920	4822 117 10711	10KΩ/ 1/16W	R1116	4822 117 10658	1.24KΩ/ 1/16W
R0921	4822 117 10724	100KΩ/ 1/16W	R1117	4822 117 10665	1KΩ/ 1/16W
R0926	4822 117 10719	47KΩ/ 1/16W	R1118	4822 117 10697	1KΩ/ 1/16W
R0927	4822 117 10713	15KΩ/ 1/16W	R1119	4822 117 10661	53MΩ/ 1/16W
R0928	4822 117 10707	5.6KΩ/ 1/16W	R1122	4822 117 10685	120Ω/ 1/16W M820 only
R0929	4822 117 10719	47KΩ/ 1/16W	R1123	4822 117 10735	1MΩ/ 1/16W
R0930	4822 117 10711	10KΩ/ 1/16W	R1124	4822 117 10683	56Ω/ 1/16W M820 only
R0931	4822 117 10692	390Ω/ 1/16W	R1125	4822 117 10683	56Ω/ 1/16W
R0933	4822 117 10711	10KΩ/ 1/16W	R1126	4822 117 10735	1MΩ/ 1/16W
R0934	4822 117 10711	10KΩ/ 1/16W	R1129	4822 117 10693	470Ω/ 1/16W
R0935	4822 117 10711	10KΩ/ 1/16W	R1130	4822 117 10724	100KΩ/ 1/16W
R0936	4822 117 10711	10KΩ/ 1/16W	R1131	4822 117 10721	56KΩ/ 1/16W
R0937	4822 117 10711	10KΩ/ 1/16W	R1133	4822 117 10724	100KΩ/ 1/16W
R0938	4822 117 10711	10KΩ/ 1/16W	R1143	4822 117 10651	750Ω/ 1/16W
R0939	4822 117 10719	47KΩ/ 1/16W	R1144	4822 117 10672	3.9KΩ/ 1/16W
R0940	4822 117 10719	47KΩ/ 1/16W	R1147	4822 117 10702	2.2KΩ/ 1/16W
R0941	4822 117 10711	10KΩ/ 1/16W	R1148	4822 117 10702	2.2KΩ/ 1/16W
R0942	4822 117 10735	1MΩ/ 1/16W	R1150	4822 117 10713	15KΩ/ 1/16W
R0944	4822 117 10735	1MΩ/ 1/16W	R1151	4822 117 10708	6.8KΩ/ 1/16W
R0946	4822 117 10711	10KΩ/ 1/16W	R1153	4822 117 10715	22KΩ/ 1/16W
R0947	4822 117 10735	1MΩ/ 1/16W	R1154	4822 117 10719	47KΩ/ 1/16W
R0948	4822 117 10735	1MΩ/ 1/16W	R1155	4822 117 10694	560Ω/ 1/16W
R0949	4822 117 10735	1MΩ/ 1/16W	R1156	4822 117 10674	100KΩ/ 1/32W

△.....Safety component, use only this type

REPLACEMENT PARTSLIST M820/ M870

R1157	4822 117 10673	1KΩ/ 1/32W
R1160	4822 117 10716	27KΩ/ 1/16W
R1162	4822 117 10708	6.8KΩ/ 1/16W
R1168	4822 117 10719	47KΩ/ 1/16W
R1169	4822 117 10724	100KΩ/ 1/16W
R1170	4822 117 10719	47KΩ/ 1/16W
R1171	4822 117 10725	120KΩ/ 1/16W
R1172	4822 117 10718	39KΩ/ 1/16W
R1173	4822 117 10725	120KΩ/ 1/16W
R1174	4822 117 10718	39KΩ/ 1/16W
R1175	4822 117 10713	15KΩ/ 1/16W
R1176	4822 117 10713	15KΩ/ 1/16W
R1177	4822 117 10664	15KΩ/ 1/16W
R1178	4822 117 10663	6.8KΩ/ 1/16W
R1179	4822 117 10656	5.1KΩ/ 1/16W
R1180	4822 117 10727	220KΩ/ 1/16W
R1181	4822 117 10717	33KΩ/ 1/16W
R1182	4822 117 10728	0.27MΩ/ 1/16W
R1183	4822 117 10668	39KΩ/ 1/16W
R1185	4822 117 10684	100Ω/ 1/16W
R1186	4822 117 10684	100Ω/ 1/16W
R1188	4822 117 10701	1.8KΩ/ 1/16W
R1189	4822 117 10691	330Ω/ 1/16W
R1190	4822 117 10735	1MΩ/ 1/16W
R1191	4822 117 10711	10KΩ/ 1/16W
R1193	4822 117 10693	470Ω/ 1/16W
R1194	4822 117 10708	6.8KΩ/ 1/16W
R1195	4822 117 10706	4.7KΩ/ 1/16W
R1197	4822 117 10735	1MΩ/ 1/16W
R1198	4822 117 10703	2.7KΩ/ 1/16W
R1206	4822 117 10711	10KΩ/ 1/16W
R1207	4822 117 10702	2.2KΩ/ 1/16W
R1208	4822 117 10708	6.8KΩ/ 1/16W M820 only
R1208	4822 117 10718	39KΩ/ 1/16W M870 only
R1211	4822 117 10715	22KΩ/ 1/16W
R1212	4822 117 10719	47KΩ/ 1/16W M870 only
R1213	4822 117 10723	82KΩ/ 1/16W M870 only
R1217	4822 117 10694	560Ω/ 1/16W
R1218	4822 117 10666	13KΩ/ 1/16W
R1219	4822 117 10662	1.65KΩ/ 1/16W
R1220	4822 117 10715	22KΩ/ 1/16W
R1221	4822 117 10715	22KΩ/ 1/16W
R1301	4822 117 10655	3.6KΩ/ 1/16W
R1302	4822 117 10653	5.49KΩ/ 1/16W
R1304	4822 117 10698	1.2KΩ/ 1/16W
R1306	4822 117 10675	1.8KΩ/ 1/16W
R1307	4822 117 10676	30KΩ/ 1/16W
R1311	4822 117 10715	22KΩ/ 1/16W
R1316	4822 117 10678	3.9Ω/ 1/16W
R1317	4822 117 10678	3.9Ω/ 1/16W
R1318	4822 117 10692	390Ω/ 1/16W
R1319	4822 117 10667	4.7KΩ/ 1/16W
R1321	4822 117 10667	4.7KΩ/ 1/16W
R1322	4822 117 10711	10KΩ/ 1/16W
R1323	4822 117 10711	10KΩ/ 1/16W
R1324	4822 117 10715	22KΩ/ 1/16W
R1325	4822 117 10715	22KΩ/ 1/16W
R1326	4822 117 10715	22KΩ/ 1/16W
R1328	4822 117 10711	10KΩ/ 1/16W

DIODES

D0001	4822 130 83511	T-462T3
D0205	4822 130 82524	DA221
D0301	4822 130 82443	MA132WA
D0303	4822 130 82444	MA132WK
D0304	4822 130 82443	MA132WA
D0305	4822 130 82444	MA132WK
D0551	4822 130 83504	D1FS4
D0552	4822 130 83503	SB07-03C
D0556	4822 130 82732	MA132K
D0557	4822 130 83503	SB07-03C
D0601	4822 130 82524	DA221
D0902	4822 130 82444	MA132WK
D0903	4822 130 83505	HSM2838C

D0912	4822 130 82444	MA132WK
D0913	4822 130 82443	MA132WA
D0914	4822 130 82444	MA132WK
D0915	4822 130 83502	1SR143
D0916	4822 130 82443	MA132WA
D0920	4822 130 83506	HSM2836C
D0921	4822 130 82524	DA221
D0922	4822 130 82444	MA132WK
D1101	4822 130 83509	HSM107S
D1102	4822 130 83508	HVM17
D1103	4822 130 82732	MA132K
D1104	4822 130 83507	RB715F
D1106	4822 130 82732	MA132K
D1107	4822 130 82732	MA132K
D1108	4822 130 82444	MA132WK
D1109	4822 130 82444	MA132WK
D1305	4822 130 82524	DA221
D1307	4822 130 82445	MA133

INTEGRATED CIRCUIT

IC0101	4822 209 32834	HA118189MP
IC0201	4822 209 32843	HA118192F
IC0202	4822 209 32829	CXL1506N
IC0203	4822 209 32821	CXL5508M-T3
IC0204	4822 209 32812	MM1029AF
IC0207	4822 209 32814	NJM2249M
IC0301	4822 209 32813	CXL1203N
IC0401	4822 209 32881	HA118176F
IC0402	4822 209 32832	LA7471M
IC0551	4822 209 32827	TL1464IPT
IC0601	4822 209 32822	XR1080CV
IC0602	4822 209 32831	LB1885M
IC0603	4822 209 32835	BA6417F
IC0901	4822 209 32841	CXP80724-193Q
IC0902	4822 209 32817	S-84206F
IC0903	4822 209 32825	HD74HCT125T
IC0904	4822 209 32833	XLU5949FS
IC0905	4822 209 32816	NJM2903V
IC1101	4822 209 32836	HA118184F
IC1102	4822 209 32819	HD49318F
IC1103	4822 209 32837	HG51B015TF
IC1104	4822 209 32818	HG51A017FB
IC1105	4822 209 32845	HD6433378V06F
IC1106	4822 209 32844	S-2939GIF10G-TF
IC1107	4822 209 32848	NJM3404AM
IC1108	4822 209 32823	TC4W66F
IC1109	4822 209 83185	NJM3414M
IC1110	4822 209 32838	UPD16508GB-2A5
IC1301	4822 209 32882	SC78014GC-550-AB8
IC1302	4822 209 32842	SC402152FB
IC1303	4822 209 32839	XPC17A85VMEL
IC1304	4822 209 32826	MB88352PFV
IC1305	4822 209 32815	MM1036
IC1306	4822 209 63526	LM324DB
IC1307	4822 209 32824	SN74HCT04ADB
IC1308	4822 209 32825	HD74HCT125T

TRANSISTORS

Q0001	4822 130 63465	PT4810F
Q0002	4822 130 63474	SPI-315-C
Q0003	4822 130 63474	SPI-315-C
Q0004	4822 130 63465	PT4810F
Q0101	4822 130 63467	FMC5
Q0102	4822 130 62579	2SB1462
Q0103	4822 130 63466	XP4213
Q0106	4822 130 63467	FMC5
Q0107	4822 130 62579	2SB1462
Q0108	4822 130 62586	2SD2216
Q0109	4822 130 63469	2SB1218 (R)
Q0110	4822 130 62565	UN9213
Q0111	4822 130 62586	2SD2216
Q0112	4822 130 62565	UN9213 M820 only

△.....Safety component, use only this type

REPLACEMENT PARTSLIST M820/ M870

Q0113	4822 130 62586	2SD2216	M870 only
Q0114	4822 130 62586	2SD2216	
Q0115	4822 130 62586	2SD2216	M870 only
Q0116	4822 130 62586	2SD2216	
Q0117	4822 130 62586	2SD2216	
Q0118	4822 130 62565	UN9213	M870 only
Q0119	4822 130 62564	UN9212	M870 only
Q0120	4822 130 62586	2SD2216	M870 only
Q0121	4822 130 62565	UN9213	M870 only
Q0122	4822 130 62565	UN9213	M870 only
Q0123	4822 130 62579	2SB1462	
Q0124	4822 130 62579	2SB1462	
Q0125	4822 130 62586	2SD2216	
Q0126	4822 130 62586	2SD2216	
Q0127	4822 130 62586	2SD2216	M870 only
Q0129	4822 130 62586	2SD2216	
Q0131	4822 130 62586	2SD2216	M870 only
Q0132	4822 130 62565	UN9213	M870 only
Q0133	4822 130 62586	2SD2216	
Q0134	4822 130 62586	2SD2216	
Q0135	4822 130 63467	FMC5	
Q0136	4822 130 62565	UN9213	
Q0137	4822 130 62565	UN9213	M870 only
Q0138	4822 130 62565	UN9213	M870 only
Q0141	4822 130 62579	2SB1462	
Q0142	4822 130 62579	2SB1462	
Q0143	4822 130 62586	2SD2216	M870 only
Q0202	4822 130 62586	2SD2216	
Q0203	4822 130 62564	UN9212	
Q0208	4822 130 62565	UN9213	
Q0210	4822 130 62565	UN9213	M870 only
Q0211	4822 130 62565	UN9213	M870 only
Q0212	4822 130 62559	UN9113	
Q0213	4822 130 61076	2SB1219	
Q0214	4822 130 62565	UN9213	
Q0215	4822 130 62579	2SB1462	
Q0216	4822 130 62579	2SB1462	
Q0217	4822 130 62579	2SB1462	
Q0218	4822 130 62586	2SD2216	
Q0219	4822 130 62579	2SB1462	
Q0220	4822 130 62565	UN9213	
Q0222	4822 130 62565	UN9213	M870 only
Q0223	4822 130 62565	UN9213	M870 only
Q0224	4822 130 62579	2SB1462	M870 only
Q0225	4822 130 62579	2SB1462	M870 only
Q0227	4822 130 62565	UN9213	M870 only
Q0228	4822 130 62565	UN9213	M870 only
Q0229	4822 130 62565	UN9213	M870 only
Q0230	4822 130 62565	UN9213	M870 only
Q0231	4822 130 62565	UN9213	M870 only
Q0233	4822 130 62565	UN9213	M870 only
Q0234	4822 130 62565	UN9213	M870 only
Q0235	4822 130 62565	UN9213	M870 only
Q0236	4822 130 62565	UN9213	M870 only
Q0239	4822 130 62565	UN9213	M870 only
Q0240	4822 130 62579	2SB1462	
Q0241	4822 130 62565	UN9213	
Q0242	4822 130 62586	2SD2216	M870 only
Q0246	4822 130 62565	UN9213	M870 only
Q0248	4822 130 62565	UN9213	
Q0249	4822 130 62565	UN9213	
Q0250	4822 130 62579	2SB1462	
Q0251	4822 130 62586	2SD2216	M870 only
Q0254	4822 130 62586	2SD2216	
Q0255	4822 130 62565	UN9213	M870 only
Q0256	4822 209 83362	FMS1	
Q0257	4822 130 62565	UN9213	M870 only
Q0258	4822 130 62565	UN9213	M870 only
Q0260	4822 130 62565	UN9213	
Q0261	4822 130 62809	XP1501	
Q0262	4822 130 62565	UN9213	M870 only
Q0263	4822 130 62565	UN9213	
Q0264	4822 130 62586	2SD2216	
Q0265	4822 130 62565	UN9213	
Q0266	4822 130 62559	UN9113	
Q0267	4822 130 62565	UN9213	

Q0268	4822 130 63472	XN1C301
Q0301	4822 130 62565	UN9213
Q0302	4822 130 62559	UN9113
Q0303	4822 130 62586	2SD2216
Q0304	4822 130 62586	2SD2216
Q0307	4822 130 62565	UN9213
Q0308	4822 130 62565	UN9213
Q0309	4822 130 62586	2SD2216
Q0311	4822 130 62579	2SB1462
Q0401	4822 130 62586	2SD2216
Q0402	4822 130 62586	2SD2216
Q0405	4822 130 62586	2SD2216
Q0407	4822 130 62579	2SB1462
Q0551	4822 130 63473	2SB1001
Q0552	4822 130 63464	MPL1
Q0553	4822 130 63464	MPL1
Q0554	4822 130 63464	MPL1
Q0555	4822 130 63468	2SK1764
Q0602	4822 130 62586	2SD2216
Q0603	4822 130 62565	UN9213
Q0605	4822 130 62565	UN9213
Q0608	4822 130 62586	2SD2216
Q0901	4822 130 62579	2SB1462
Q0902	4822 130 60731	2SA1036K
Q0903	4822 130 62586	2SD2216
Q0904	4822 130 62586	2SD2216
Q0905	4822 130 62579	2SB1462
Q0906	4822 130 62586	2SD2216
Q0907	4822 130 62586	2SD2216
Q0908	4822 130 62586	2SD2216
Q0912	4822 130 62565	UN9213
Q0915	4822 130 62586	2SD2216
Q0916	4822 130 63471	2SD1766 (R)
Q0917	4822 130 62586	2SD2216
Q0918	4822 130 62576	XP4501
Q0919	4822 130 62579	2SB1462
Q1100	4822 130 62565	UN9213
Q1101	4822 130 62579	2SB1462
Q1102	4822 130 62579	2SB1462
Q1103	4822 130 62559	UN9113
Q1104	4822 130 62565	UN9213
Q1105	4822 130 63475	2SC2462LD
Q1106	4822 130 62575	XP4401
Q1107	4822 130 62586	2SD2216
Q1109	4822 130 62579	2SB1462
Q1110	4822 130 62565	UN9213
Q1112	4822 130 42459	2SA1121C (SC)
Q1113	4822 130 62565	UN9213
Q1301	4822 130 60663	DTA143EK

TRANSFORMERS

T0551 4822 146 21766 TRANSFORMER

BACKUP BATTERY

LI0901 4822 138 10538 BATTERY

COILS

L0101	4822 157 70892	100µH
L0104	4822 157 70898	27µH
L0105	4822 157 70892	100µH
L0106	4822 157 70894	2.7µH
L0107	4822 157 70894	2.7µH
L0108	4822 157 70905	220µH
L0109	4822 157 70903	150µH
L0110	4822 157 70895	6.8µH
L0111	4822 157 70893	330µH
L0113	4822 157 70909	470µH
L0114	4822 157 70903	150µH
L0115	4822 157 70905	220µH
L0116	4822 157 70904	180µH

△.....Safety component, use only this type

REPLACEMENT PARTSLIST M820/ M870

L0117	4822 157 70916	3.3μH M870 only
L0118	4822 157 70896	10μH
L0119	5322 502 11666	
L0120	4822 157 70896	10μH M870 only
L0124	4822 157 70892	100μH
L0125	4822 157 70892	100μH
L0129	4822 157 70897	15μH M870 only
L0201	4822 157 70891	47μH
L0203	4822 157 70885	
L0204	4822 157 70896	10μH
L0205	4822 157 70904	180μH
L0206	4822 157 70889	22μH
L0208	4822 157 70902	120μH
L0209	4822 157 70889	22μH
L0210	4822 157 70899	68μH
L0211	4822 157 70889	22μH
L0215	4822 157 70891	47μH
L0216	4822 157 70903	150μH M870 only
L0218	4822 157 70901	82μH
L0301	4822 157 70892	100μH
L0401	4822 157 70891	47μH
L0402	4822 157 70892	100μH
L0551	4822 157 70906	
L0552	4822 157 70906	
L0553	4822 157 70907	
L0554	4822 157 70906	
L0555	4822 157 70887	10μH
L0556	4822 157 70906	
L0557	4822 157 70908	
L0560	4822 157 70908	
L0563	4822 157 70908	
L0564	4822 157 70887	10μH
L0565	4822 157 70892	100μH
L0566	4822 157 70892	100μH
L0567	4822 157 70887	10μH
L0568	4822 157 70887	10μH
L0602	4822 157 70887	10μH
L0901	4822 157 70886	1μH
L0902	4822 157 70891	47μH
L0903	4822 157 70892	100μH
L0904	4822 157 70888	15μH
L0907	4822 157 70897	15μH
L0909	4822 157 70887	10μH
L0910	4822 157 70892	100μH
L1102	4822 157 70887	10μH
L1103	4822 157 70887	10μH
L1105	4822 157 70887	10μH
L1106	4822 157 70887	10μH
L1107	4822 157 70887	10μH
L1108	4822 157 70887	10μH
L1109	4822 157 70892	100μH
L1301	4822 157 70887	10μH
L1302	4822 157 70887	10μH
L1303	4822 157 70889	22μH

CRYSTALS

X0201	4822 242 81602	CRYSTAL
X0601	4822 242 81604	CRYSTAL
X0901	4822 242 81604	CRYSTAL
X0902	4822 242 81601	CRYSTAL
X1101	4822 242 81603	CRYSTAL
X1102	4822 242 81599	CRYSTAL

FILTERS

BL0394	4822 157 70912	FILTER
BL0395	4822 157 70912	FILTER
BL0396	4822 157 70912	FILTER
BL0397	4822 157 70912	FILTER
BL0398	4822 157 70912	FILTER M870 only
BL0399	4822 157 70912	FILTER

CONNECTORS

CN0005	4822 320 50326	CONNECTOR
CN0901	4822 320 50328	CONNECTOR
CN0902	4822 320 50329	CONNECTOR

FILTERS

CP0201	4822 157 70917	FILTER,TRAP M870 only
CP0202	4822 157 70914	FILTER
CP0203	4822 157 70913	FILTER
CP0204	4822 156 21704	BAND PASS
CP0205	4822 320 40305	DELAY LINE M870 only
CP0206	4822 156 21706	LOW PASS M870 only
CP0307	4822 156 21703	BAND PASS
CP0401	4822 157 70918	FILTER M870 only
CP0402	4822 157 70911	FILTER
CP1102	4822 156 21707	LOW PASS

FUSES

F0551	4822 252 51162	FUSE
F0552	4822 252 51163	FUSE,0.8A

PLUGS/ SOCKET

JK0200	4822 267 60374	SOCKET
PG0001	4822 267 51308	MINI PLUG
PG0101	4822 267 51312	PLUG
PG0400	4822 267 31712	MINI PLUG
PG0401	4822 267 31712	MINI PLUG M870 only
PG0402	4822 267 31714	MINI PLUG
PG0551	4822 267 31711	PLUG
PG0601	4822 267 51313	MINI PLUG
PG0602	4822 267 51309	PLUG
PG0603	4822 267 51311	MINI PLUG
PG0604	4822 267 31712	MINI PLUG
PG0901	4822 267 51307	PLUG
PG0902	4822 267 31715	PLUG
PG0903	4822 267 41123	MINI PLUG
PG0904	4822 267 31712	MINI PLUG
PG0905	4822 267 41122	PLUG
PG0906	4822 267 41121	PLUG
PG0907	4822 267 41122	PLUG
PG1101	4822 267 51305	PLUG
PG1102	4822 267 31721	PLUG M870 only
PG1301	4822 267 31713	PLUG

SWITCHES

SW0908	4822 276 13459	
S0003	4822 277 21722	
S0004	4822 277 21722	
S0005	4822 277 21722	
S0006	4822 276 13011	
S0007	4822 273 10277	STATE SWITCH
S0901	4822 277 21719	
S0902	4822 277 21721	
S0903	4822 276 13458	
S0904	4822 276 13458	
S0905	4822 276 13458	
S0906	4822 276 13458	
S0907	4822 276 13458	
S0909	4822 276 13458	

⚠.....Safety component, use only this type

REPLACEMENT PARTSLIST M820/ M870

CAPACITORS

C1001	4822 124 80757	47μF/ 4V
C1002	4822 124 80749	3.3μF/ 35V
C1003	4822 124 80759	47μF/ 16V
C1004	4822 126 13022	0.01μF/ 50V
C1005	4822 124 80756	33μF/ 25V
C1006	4822 126 13022	0.01μF/ 50V
C1007	4822 126 12969	12PF/ 50V

RESISTORS

R1001	4822 117 10708	6.8KΩ/ 1/16W
R1002	4822 117 10684	100Ω/ 1/16W
R1003	4822 117 10696	820Ω/ 1/16W
R1004	4822 117 10724	100KΩ/ 1/16W
R1005	4822 117 10718	39KΩ/ 1/16W
R1006	4822 117 10735	1MΩ/ 1/16W
R1007	4822 117 10735	1MΩ/ 1/16W
R1008	4822 117 10621	680Ω/ 0.1W
R1012	4822 117 10684	100Ω/ 1/16W M820 only
R1013	4822 117 10684	100Ω/ 1/16W M870 only

DIODES

D1001	4822 130 83516	LT1D82A
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INTEGRATED CIRCUITS

IC1002	4822 209 32872	MODULE
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TRANSISTORS

Q1001	4822 130 63481	2SC2620-Q C
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PLUGS

PG1001	4822 267 51306	PLUG
CN2001	4822 320 50327	CONNECTOR

SOCKET

CS2001	4822 267 51314	SOCKET,CRT
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CAPACITORS

C2001	4822 124 80759	47μF/ 16V
C2002	4822 124 80759	47μF/ 16V
C2003	4822 124 80748	2.2μF/ 50V
C2004	4822 121 70408	
C2005	4822 124 80733	47μF/ 25V
C2006	4822 126 12952	1000PF/ 1000V
C2007	4822 126 12953	1000PF/ 500V
C2008	4822 124 80748	2.2μF/ 50V
C2009	4822 126 12966	0.1μF/ 50V
C2011	4822 126 12949	180PF/ 50V
C2012	4822 126 12966	0.1μF/ 50V
C2013	4822 126 12966	0.1μF/ 50V
C2014	4822 121 70409	0.1μF/ 50V
C2015	4822 126 12946	2200PF/ 50V
C2016	4822 126 12962	0.01μF/ 50V
C2017	4822 124 80747	1μF/ 50V
C2018	4822 126 12965	1μF/ 16V

VARIABLE RESISTORS

RT2001	4822 100 12094	2.2MΩ
RT2002	4822 100 12106	1MΩ

RT2003	4822 100 12095	470Ω
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RESISTORS

R2001	4822 117 10627	5.6KΩ/ 0.1W
R2002	4822 117 10632	150KΩ/ 0.1W
R2003	4822 117 10634	560KΩ/ 0.1W
R2004	4822 117 10635	1MΩ/ 0.1W
R2005	4822 117 10635	1MΩ/ 0.1W
R2006	4822 117 10618	10Ω/ 0.1W
R2007	4822 117 10635	1MΩ/ 0.1W
R2008	4822 117 10635	1MΩ/ 0.1W
R2009	4822 117 10625	2.2KΩ/ 0.1W
R2011	4822 117 10623	1.5KΩ/ 0.1W
R2012	4822 117 10628	15KΩ/ 0.1W
R2013	4822 117 10623	1.5KΩ/ 0.1W
R2014	4822 117 10624	1.8KΩ/ 0.1W
R2015	4822 117 10629	47KΩ/ 0.1W
R2016	4822 117 10617	3.9Ω/ 0.1W
R2017	4822 117 10624	1.8KΩ/ 0.1W
R2018	4822 117 10629	47KΩ/ 0.1W
R2019	4822 117 10626	2.7KΩ/ 0.1W
R2020	4822 117 10631	100KΩ/ 0.1W
R2021	4822 117 10641	10KΩ/ 0.1W
R2022	4822 117 10619	100Ω/ 0.1W
R2024	4822 117 10635	1MΩ/ 0.1W
R2025	4822 117 10633	390KΩ/ 0.1W
R2026	4822 117 10622	1KΩ/ 0.1W
R2027	4822 117 10622	1KΩ/ 0.1W

DIODES

D2001	4822 130 80526	MA141K
D2002	4822 130 83515	MA199

INTEGRATED CIRCUITS

IC1001	4822 209 32884	ICX 05
IC2001	4822 209 32871	HA118179F

TRANSISTORS

Q2001	4822 130 63478	2SD974
Q2002	4822 130 63479	XN1B301

FUSES

TF2001	4822 252 51161	FUSE
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TRANSFORMERS

T2001	4822 146 21767	TRANSFORMER
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COILS

L2001	4822 157 70884	47μH
L2002	4822 157 70915	

CONNECTORS

PG2001	4822 267 41124	CONNECTOR
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△.....Safety component, use only this type

CHAPTER 8

AC-ADAPTOR CHARGER

SBC5450

- Disassembly of the AC-adaptor
- Schematic diagram
- Circuit board layout
- Exploded view
- Partslist

DISASSEMBLY

1. Remove four (4) screws.
2. Remove the bottom case in the direction of the arrow
3. Unsolder three (3) points.
4. Remove the adapter circuit board in the direction of the arrow.
5. Remove one (1) screw.
6. Release twon (2) tabs.

Note

No electrical adjustment is necessary.
Also no adjustment required after parts are replaced.

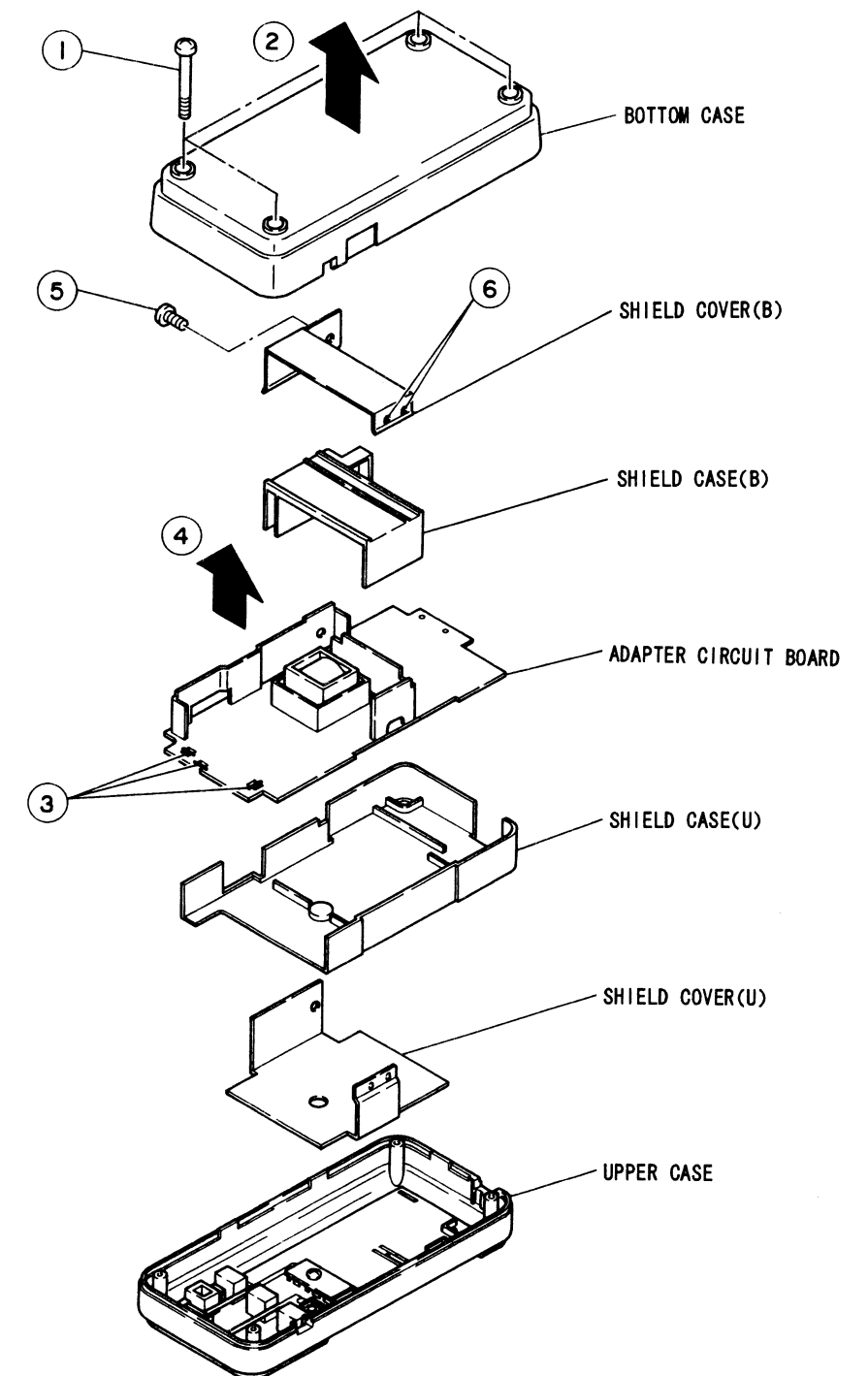
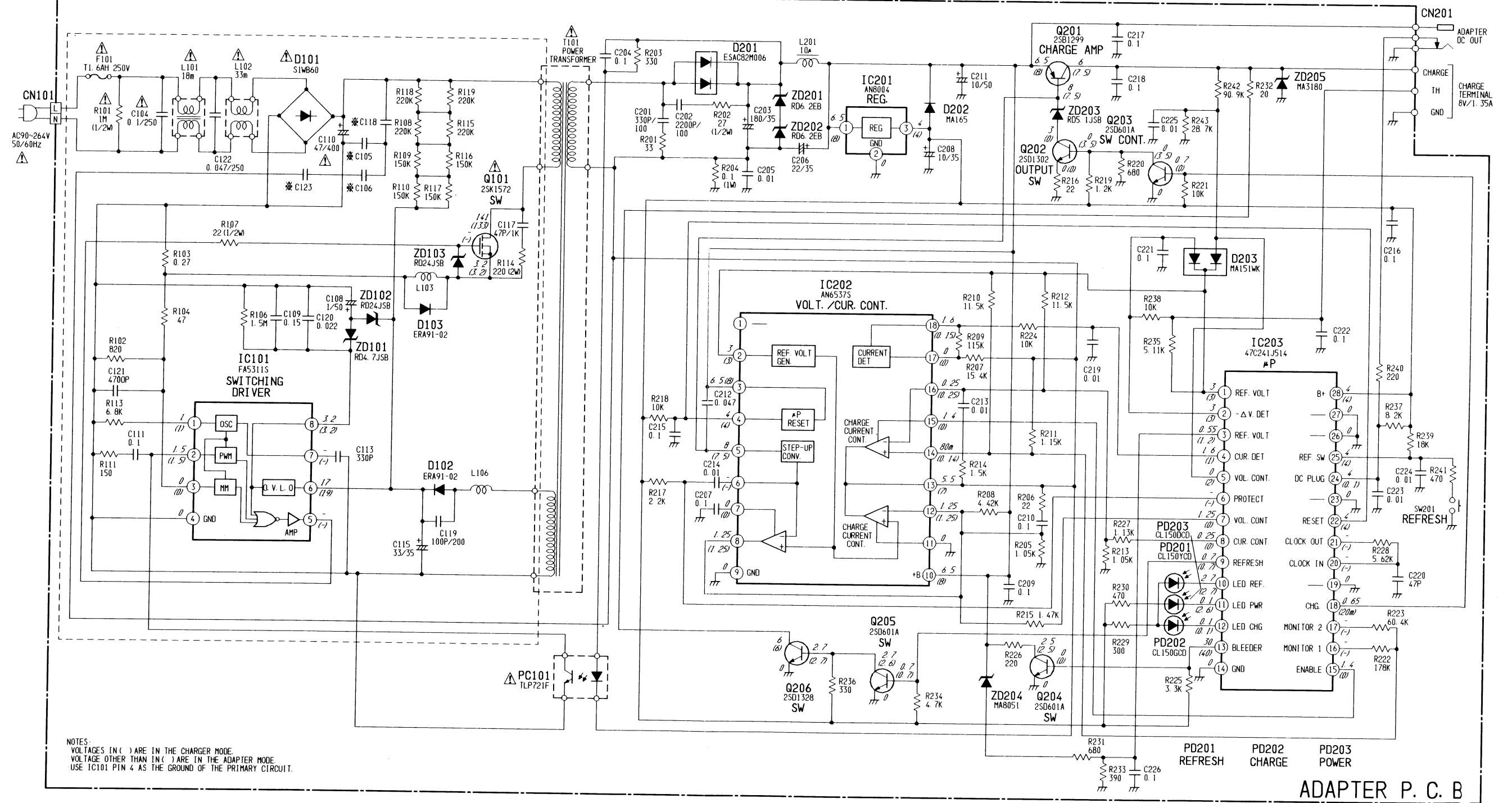


Fig. 1-1

ADAPTER SCHEMATIC DIAGRAM

	C105	C106	C118	C123
E	3300P	3300P	3300P	3300P
E (UK)	2200P	JUMPER	2200P	2200P
E (AU)	2200P	JUMPER	2200P	2200P



1

2

3

4

5

6

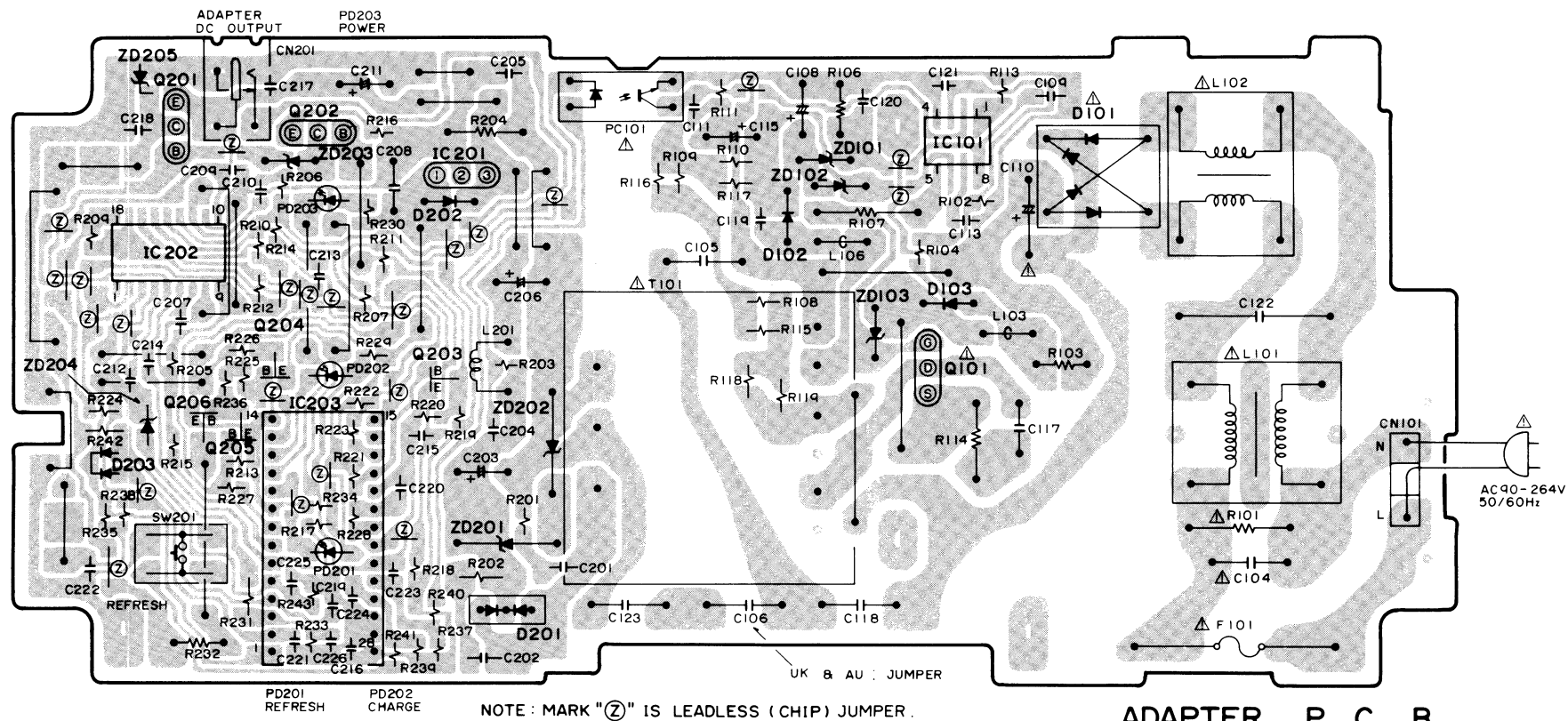
7

8

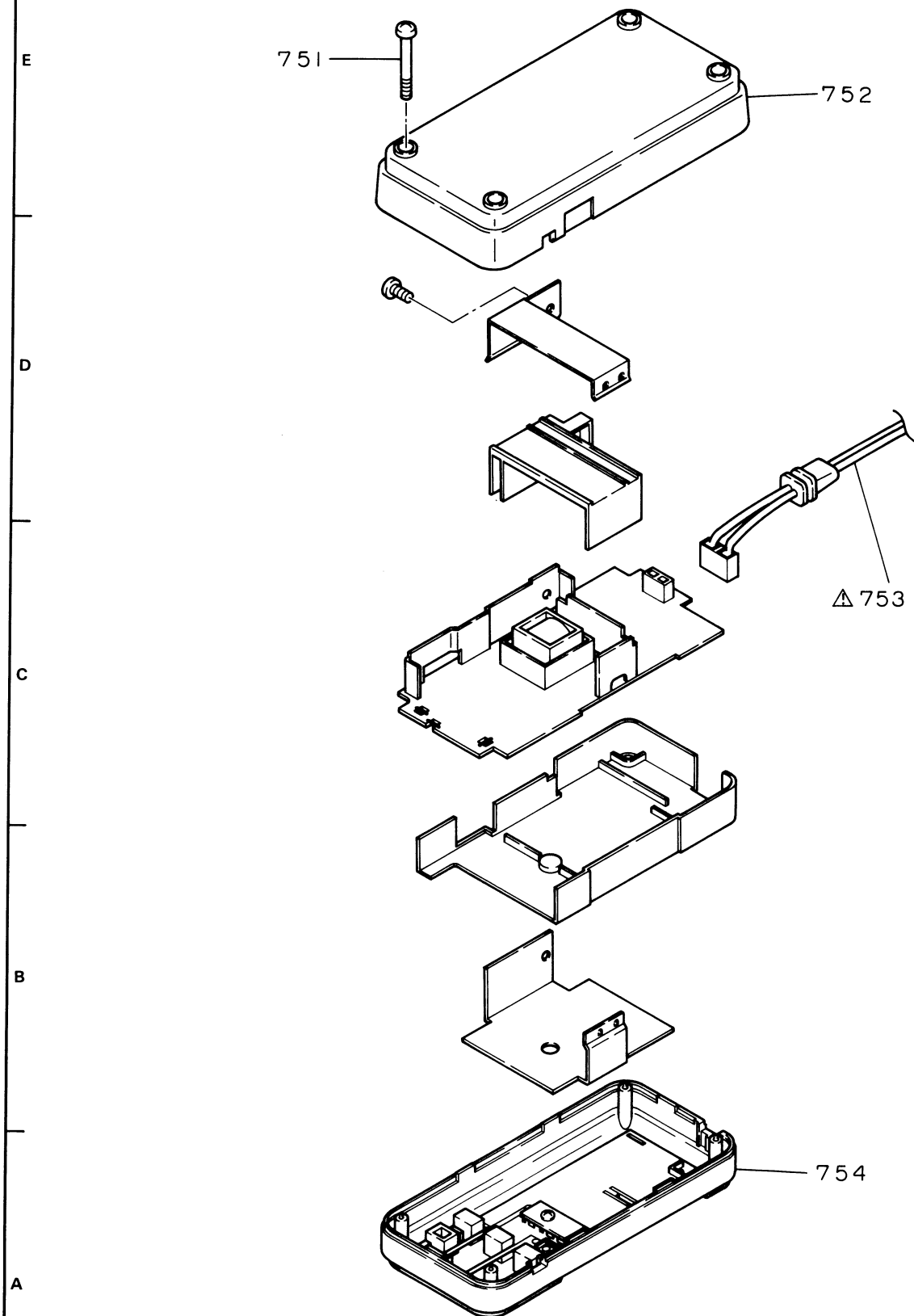
ADAPTER

ADAPTER

ADAPTER CIRCUIT BOARD



EXPLODED VIEWS



1

2

3

4

REPLACEMENT PARTSLIST SBC5450

MECHANICAL PARTS

HOUSING PARTS

751	4822 502 21476	SCREW
752	4822 432 60835	LOWER CASE
753 	4822 321 11024	AC CABLE
754	4822 432 60836	UPPER CASE

ELECTRICAL PARTS

DIODES

D101	4822 130 32748	DIODE
D102	4822 130 83531	DIODE SERA91-02
D103	4822 130 83531	DIODE SERA91-02
D210	4822 130 83532	DIODE ESAC82M006
D202	4822 130 32362	DIODE MA165
D203	4822 130 43408	DIODE MA151WK

INTEGRATED CIRCUITS

IC101	4822 209 32909	FA5311S
IC201	4822 209 32917	AN8004
IC202	4822 209 32907	AN6537S
IC203	4822 209 32911	TMP47C241N-J514
PC101 	4822 209 32912	TLP721F opto coupler

TRANSISTORS

Q101 	4822 130 63039	2SK1572
Q201	4822 130 63493	2SB1299
Q202	4822 130 42125	2SD1302
Q203	4822 130 42671	2SD601A
Q204	4822 130 42671	2SD601A
Q205	4822 130 42671	2SD601A
Q206	4822 130 42668	2SD1328

Z-DIODES

ZD101	4822 130 83528	RD4.7JSB
ZD102	4822 130 83527	RD24JSB
ZD103	4822 130 83527	RD24JSB
ZD201	4822 130 31157	RD6.2EB
ZD202	4822 130 31157	RD6.2EB
ZD203	4822 130 83528	RD4.7JSB

FUSE

F101 	4822 253 30447	FUSE 1.6A 250V
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